

Solarstrom in Deutschland: „Klimakiller“ Nummer 1!

Die Vertreter der Solarbranche sowie vieler Nichtregierungsorganisationen wie z.B. WWF oder Greenpeace vertreten die Meinung, dass Kohle der Klimakiller Nr. 1 sei. Kohle deckt rund 40 % des Weltenergiebedarfs; in China beträgt der Anteil der Kohle sogar 70 %. Kohle wird noch für viele Jahrhunderte die wichtigste Energiequelle für die ganze Welt bleiben, da sie nicht nur billig, sondern auch in grossen Mengen vorhanden ist.

Aber stimmt denn diese Aussage der Solarbranche und der Nichtregierungsorganisationen? Unbestritten ist, dass bei der Verbrennung von Kohle Kohlendioxid entsteht. Aber auch Photovoltaik(PV)-Anlagen führen zur Emission von klimawirksamen Treibhausgasen – nicht beim Betrieb, sondern bei der Herstellung.

Beim Errechnen der Auswirkungen der PV-Anlagen aufs Klima pro Einheit Nutzenergie (kWh elektrisch ab Klemme) sind vor allem massgebend: die Herstellung der Solarmodule in China, speziell die Raffination von Solar-Silizium unter Einsatz erheblicher Mengen von Chemikalien und Rohstoffen, die Herstellung der Nebenanlagen, der Transport der Materialien nach Europa und demgegenüber die erfahrungsgemäss bescheidene Stromausbeute unter den klimatischen Verhältnissen in Deutschland.

Wie viel CO₂ emittiert ein modernes Kohlekraftwerk ?

Moderne Dampfkraftwerke mit Kohlenstaubfeuerung und überkritischen Frischdampfparametern (sog. Clean Coal Technology) erreichen einen thermischen Wirkungsgrad von 52%. Das bedeutet, dass sie 846 Gramm CO₂ pro kWh Strom emittieren, wenn sie mit Steinkohle (Heizwert: 30 MJ/kg) betrieben werden. Ferner sind moderne Kohlekraftwerke mit hocheffizienten

Filtern versehen, so dass die Emission von Staubpartikeln minim ist.

Hinzuzufügen ist, dass Kohlekraftwerke bedarfsgerecht Strom produzieren und deswegen weder Speichieranlagen noch Reservekapazitäten benötigen. Die Letzteren sind aber bei Solarstrom unabdingbar und verursachen Umwandlungsverluste.

**Herstellung der
Solarmodule in
China und
Herstellung der
Nebenanlagen**

**Heute werden rund
80 % der in Europa**

**eingesetzten
Solarmodule in
China hergestellt
(siehe EU anti-
dumping
investigation on
solar panel imports
from China). Die
Herstellung von
ultrareinem
Silizium für die
Modulzellen ist**

**extrem
energieintensiv.
Nach Prof. Jian
Shuisheng von der
Pekinger Jiatong-
Universität sind in
der chinesischen
Industrie pro
Quadratmeter Modul
mehr als 300 kg
Kohle notwendig.
Daraus entstehen**

**mehr als 1'100 kg
CO₂, das in die
Atmosphäre
gelangt.**

**Auch die Fertigung
der Nebenanlagen
eine PV-Anlage wie
z.B.**

**Wechselrichter,
Batterien,
Kupferkabel,
Schalter,**

**Instrumente,
Abstützungen und
Beton braucht
fossile
Brennstoffe. Der
Energiebedarf für
Nebenanlagen wird
in der
Fachliteratur auf
zusätzliche 13%
geschätzt. Also
summieren sich die**

**Gesamtemissionen
pro Quadratmeter
Solarpanel auf
1'243 kg CO₂.**

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**Herstellung
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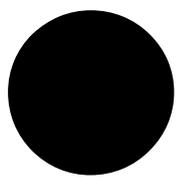
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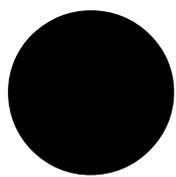
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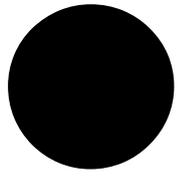
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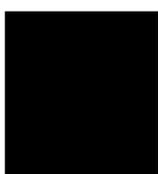
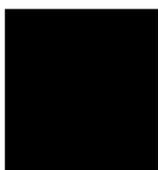
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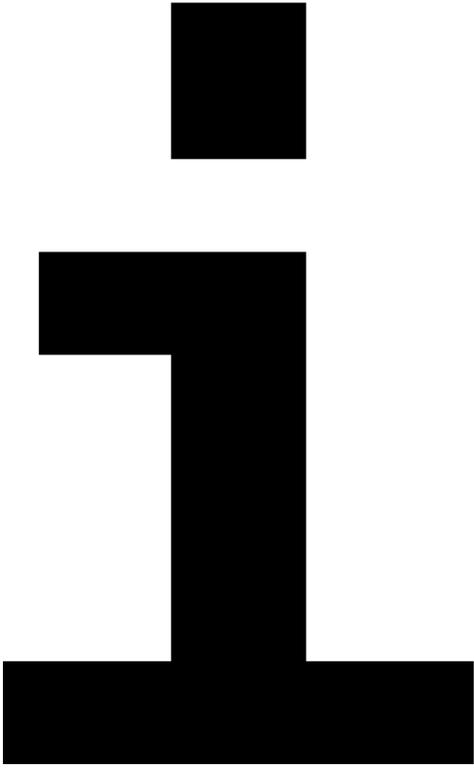
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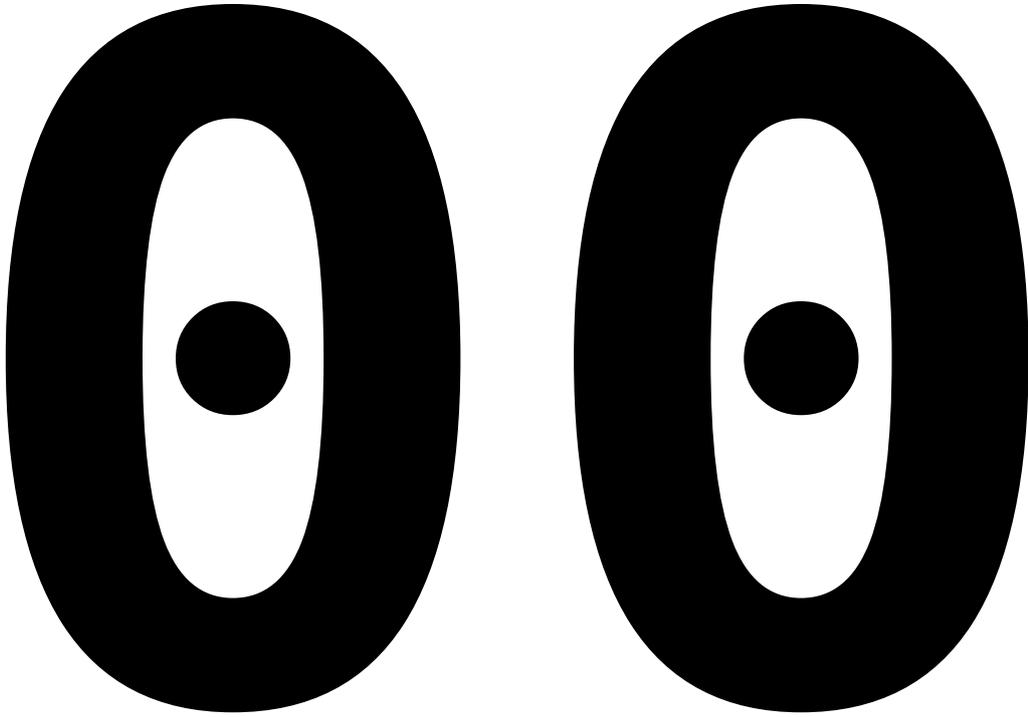
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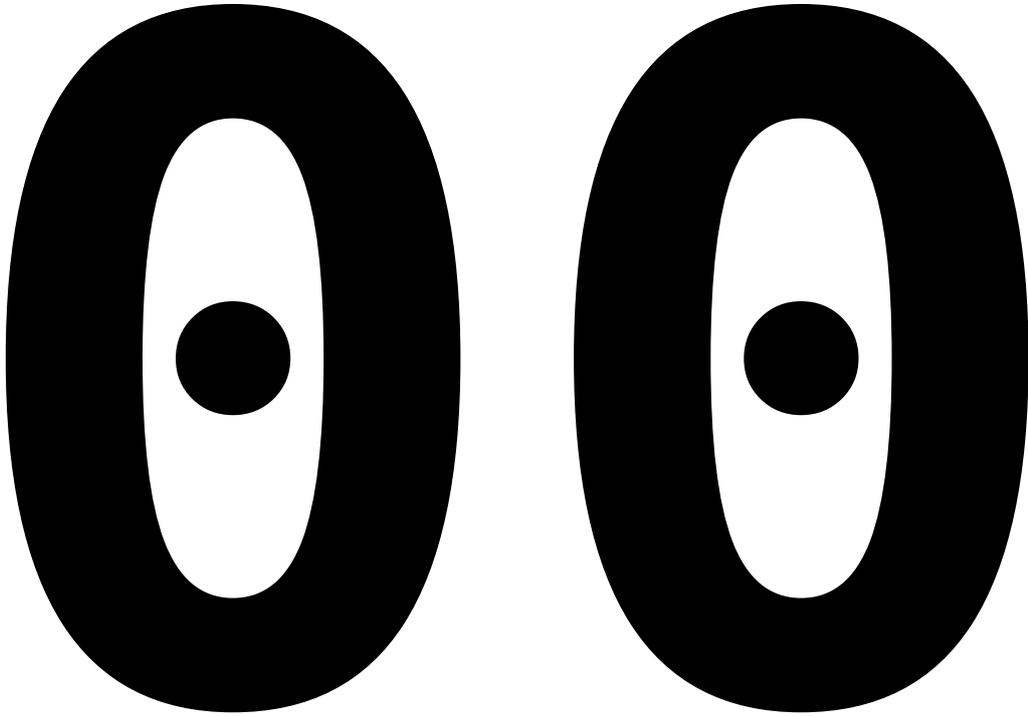
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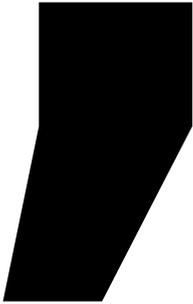
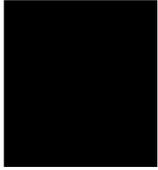
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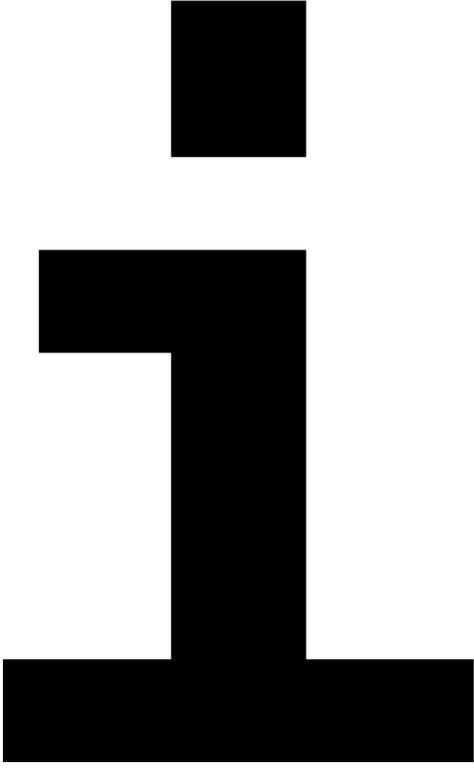
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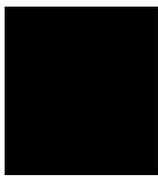
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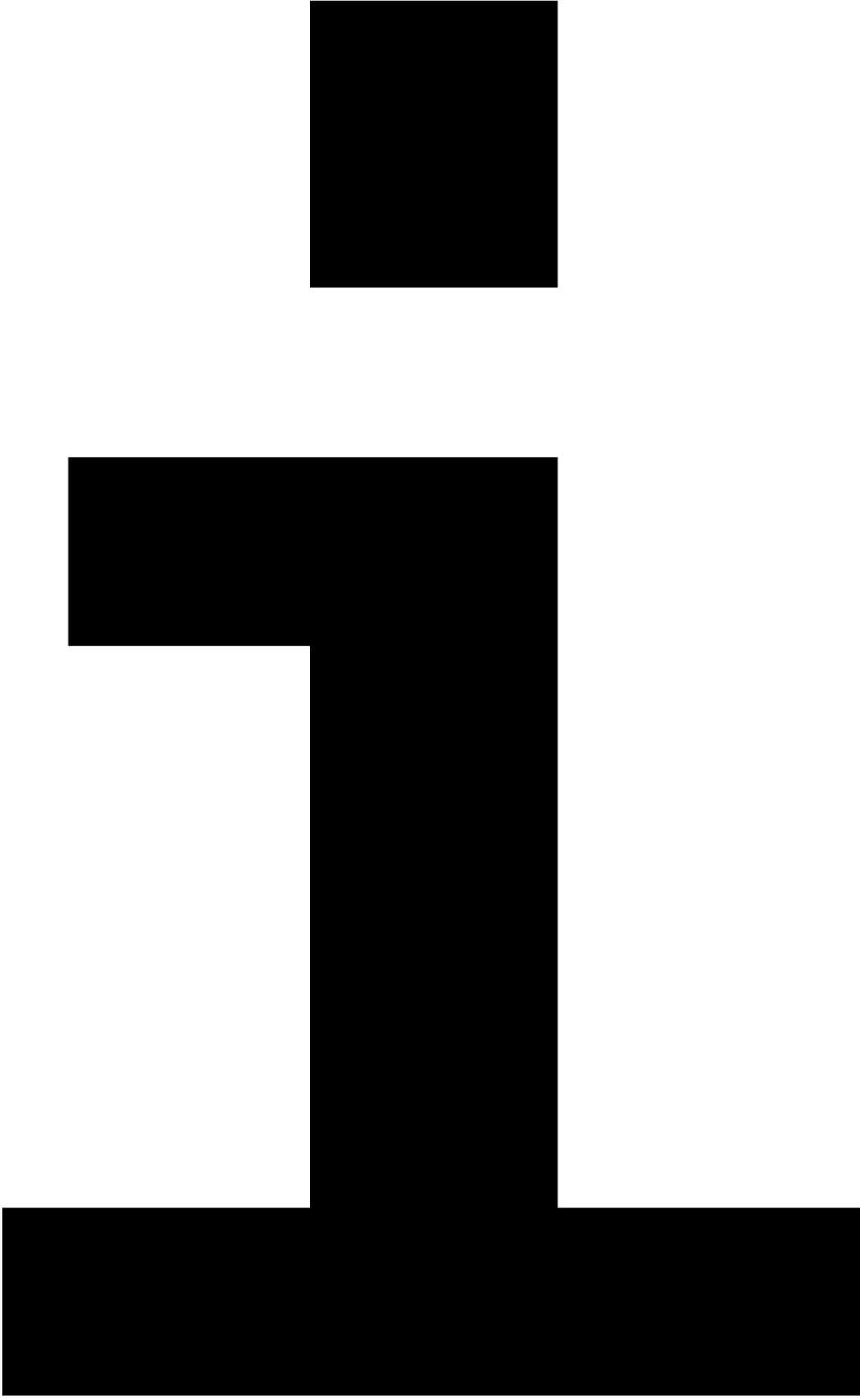
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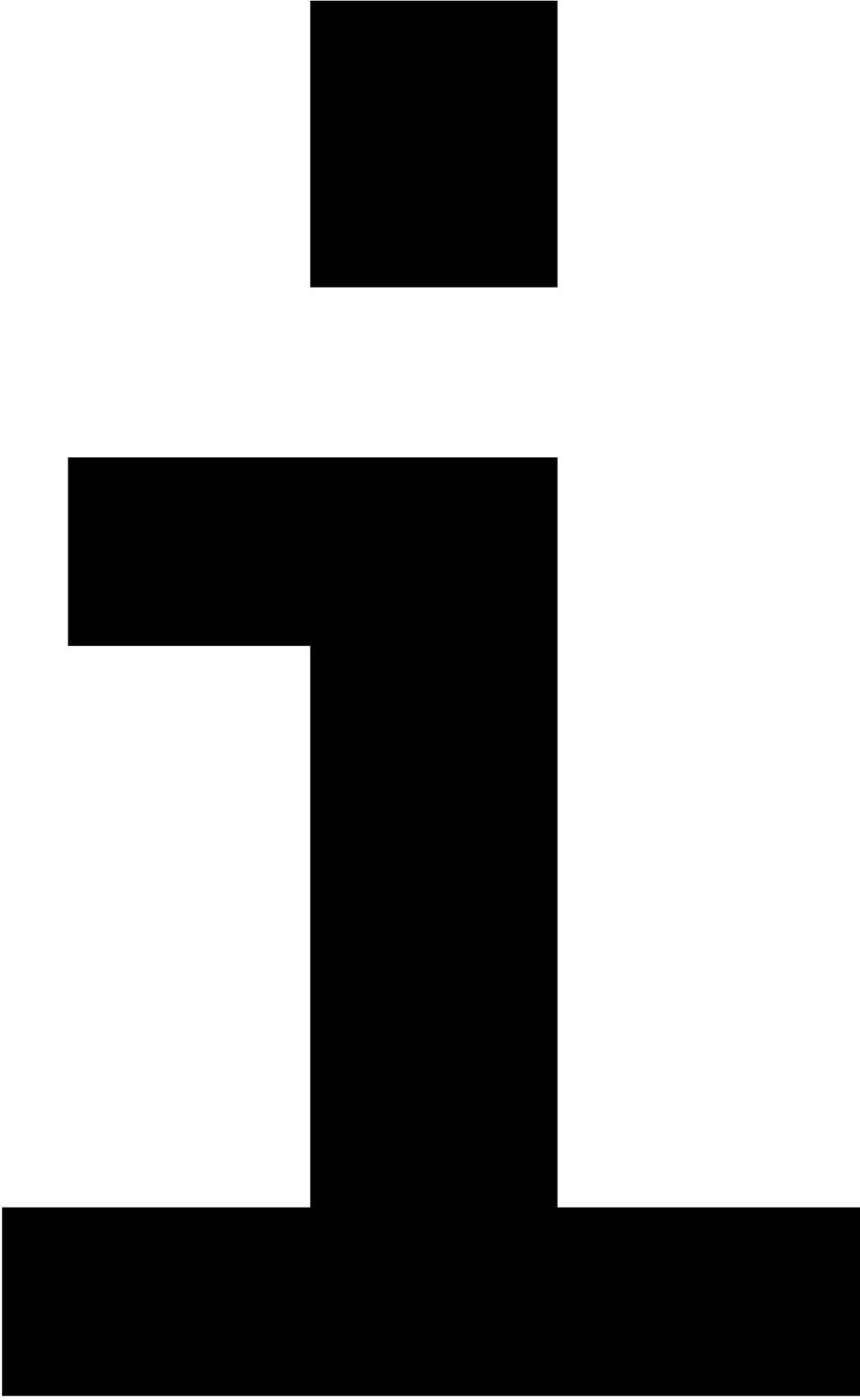


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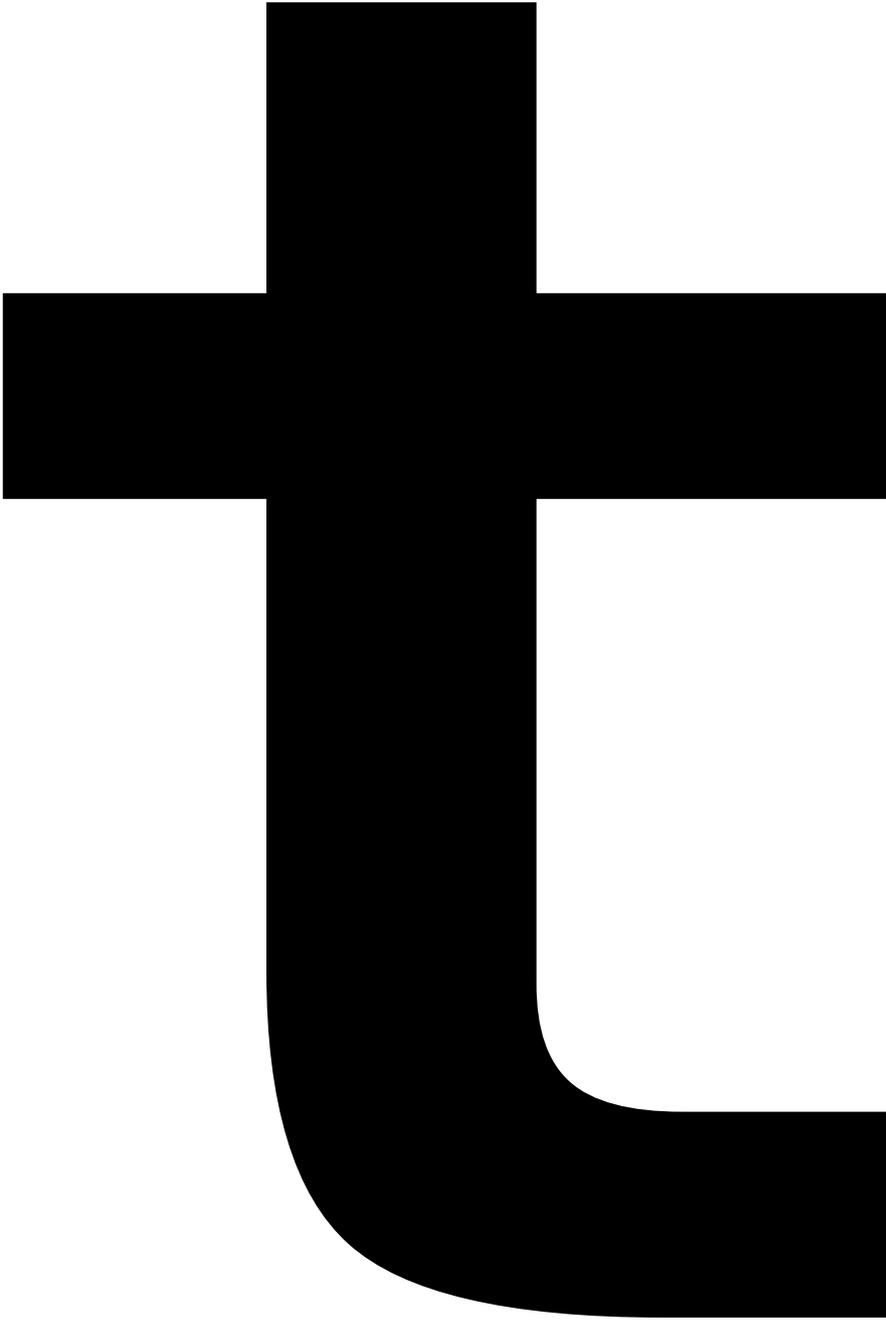


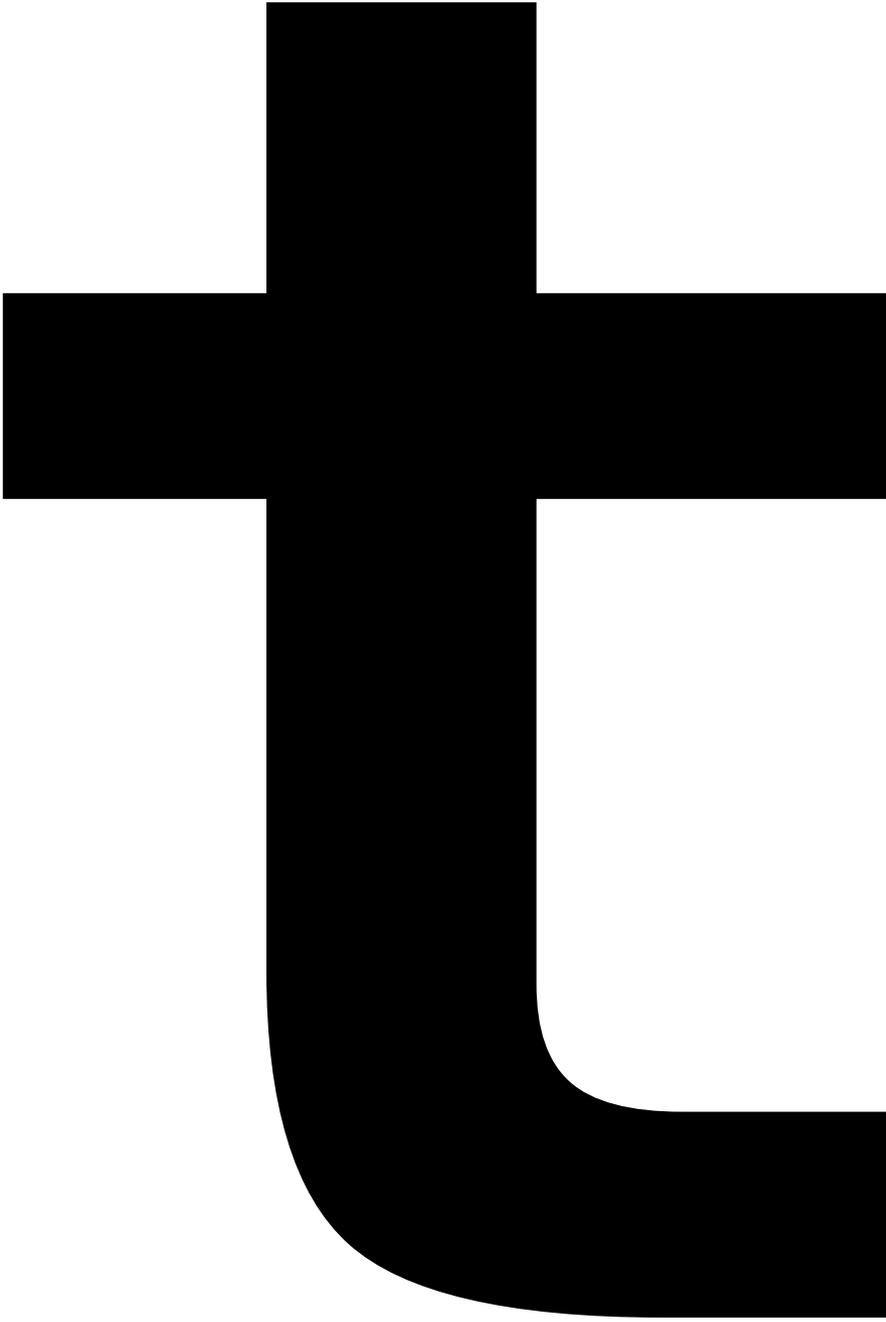
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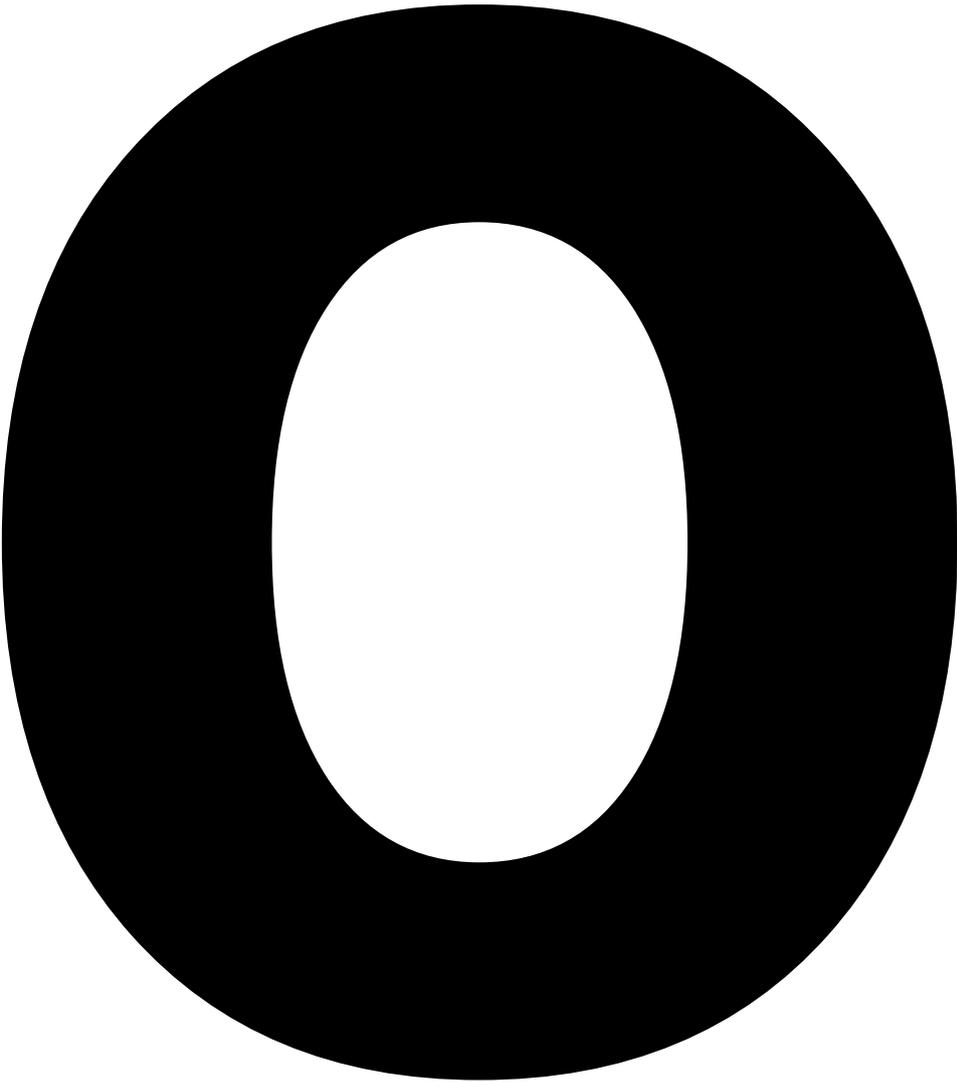
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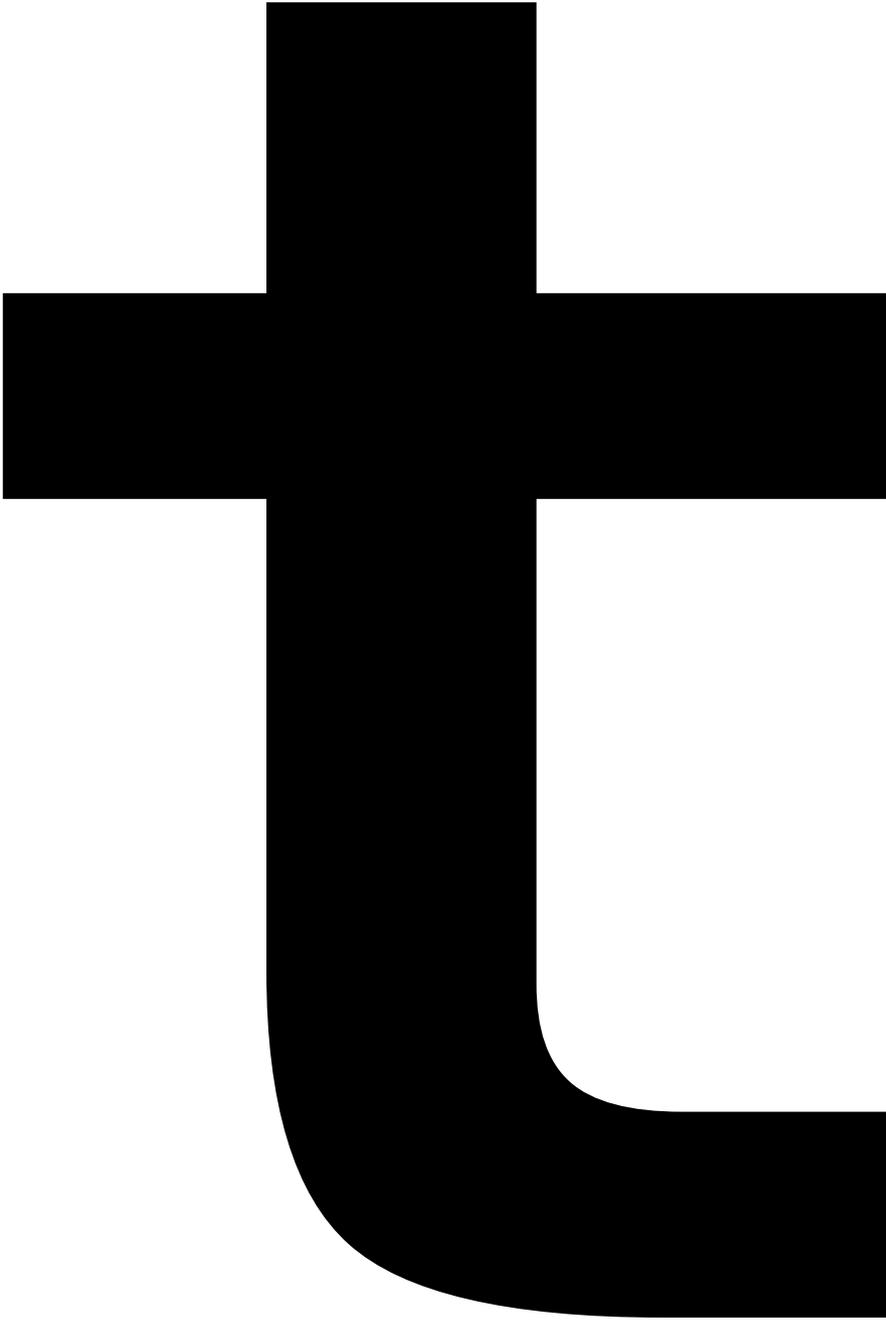




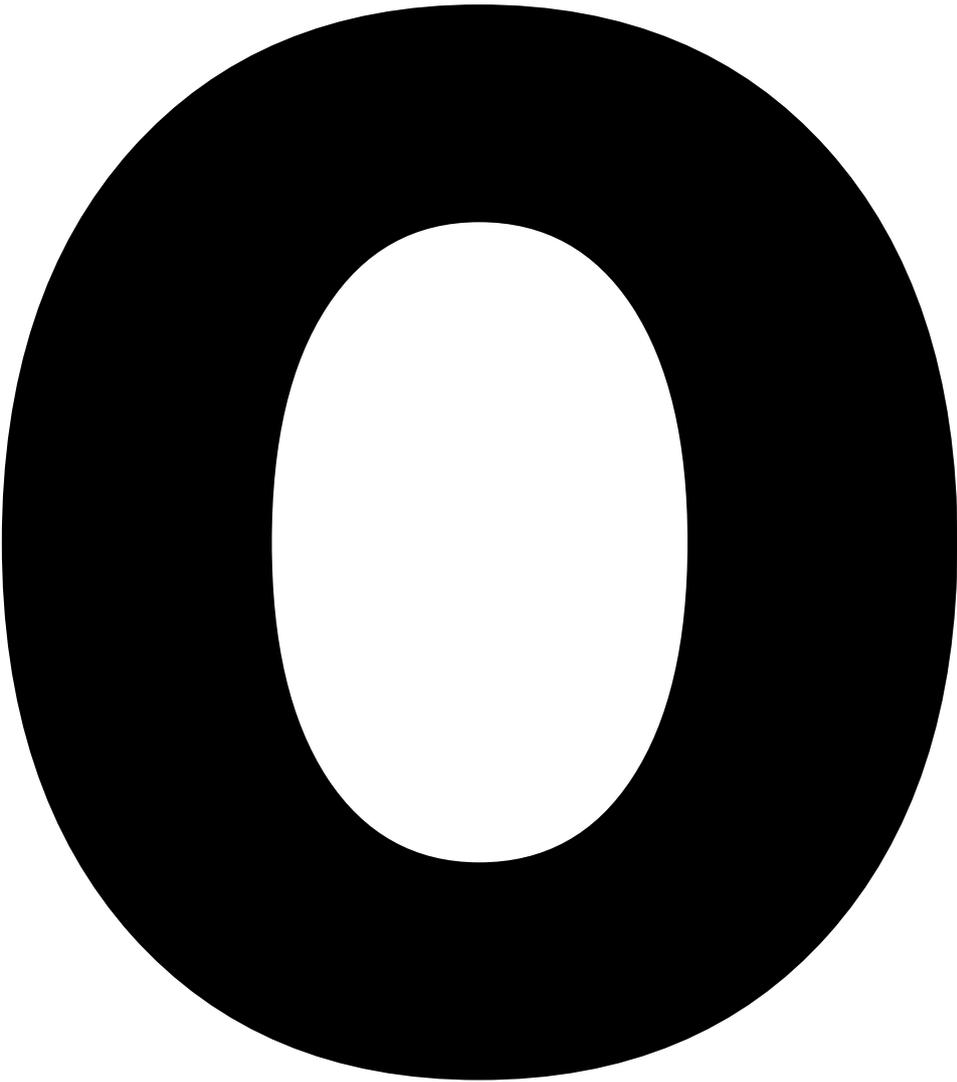




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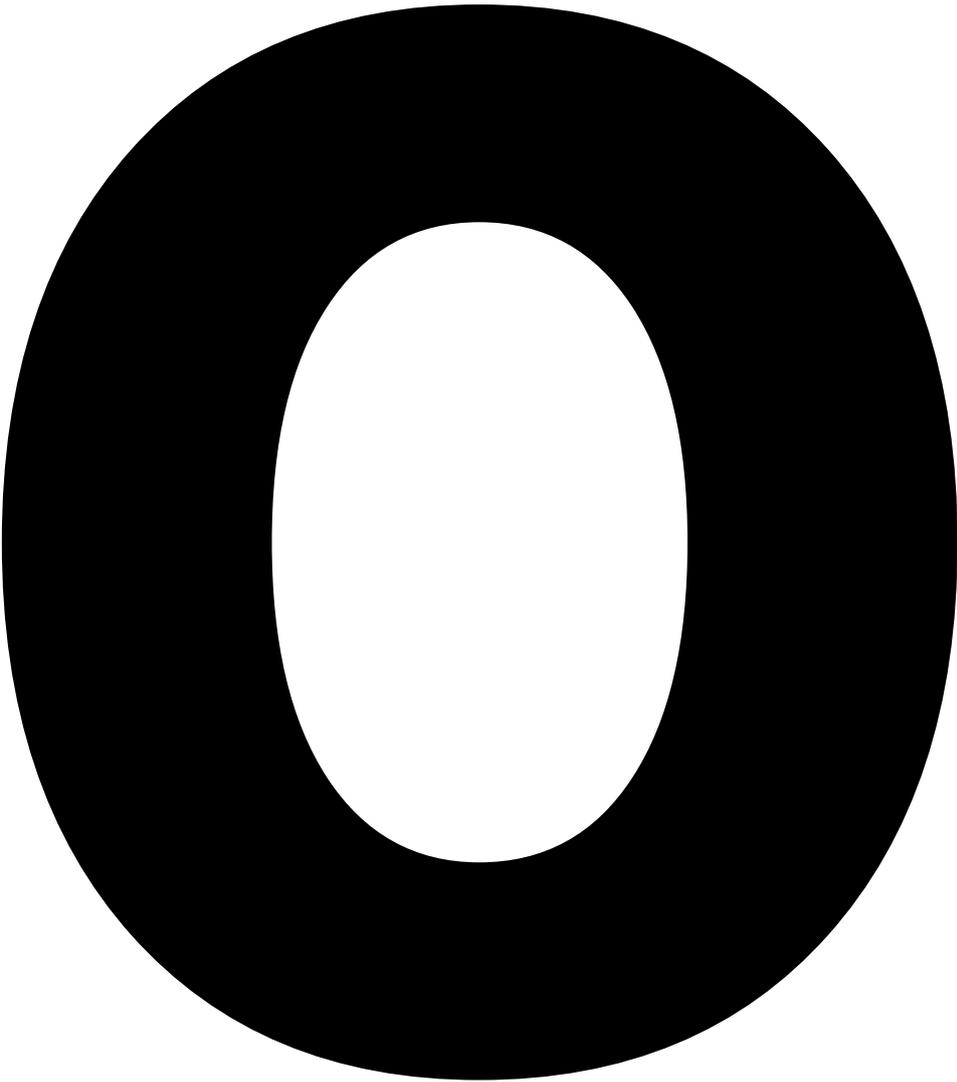
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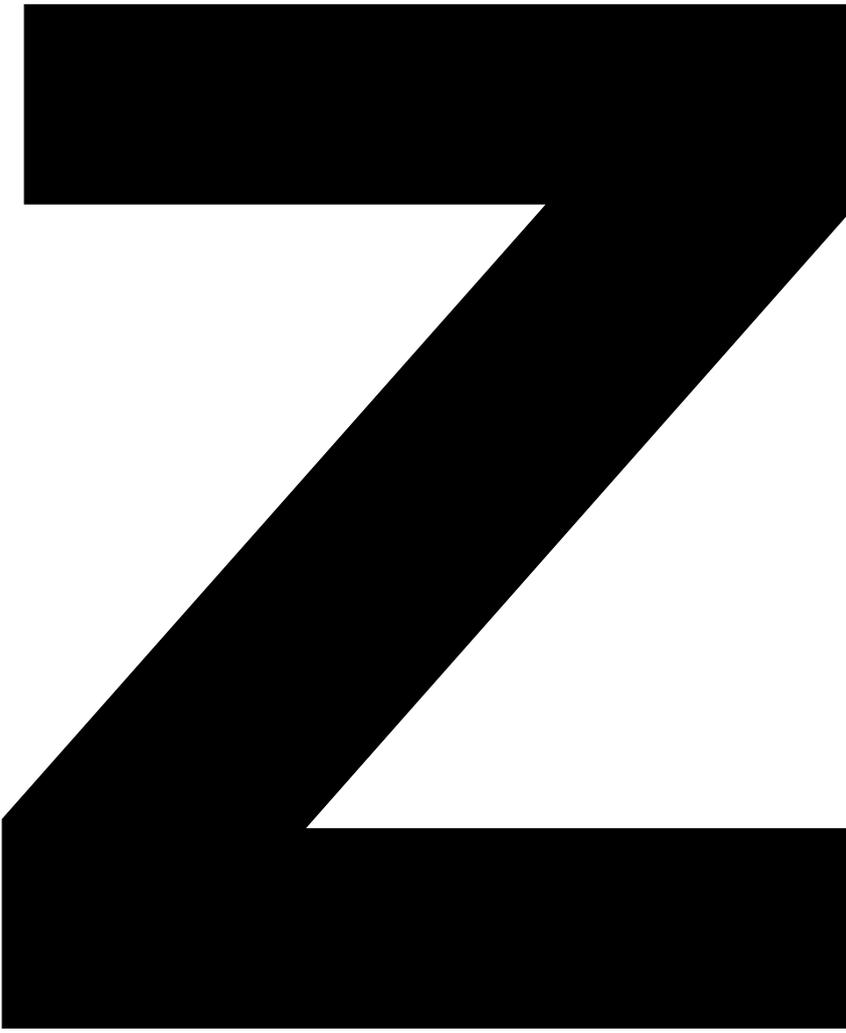
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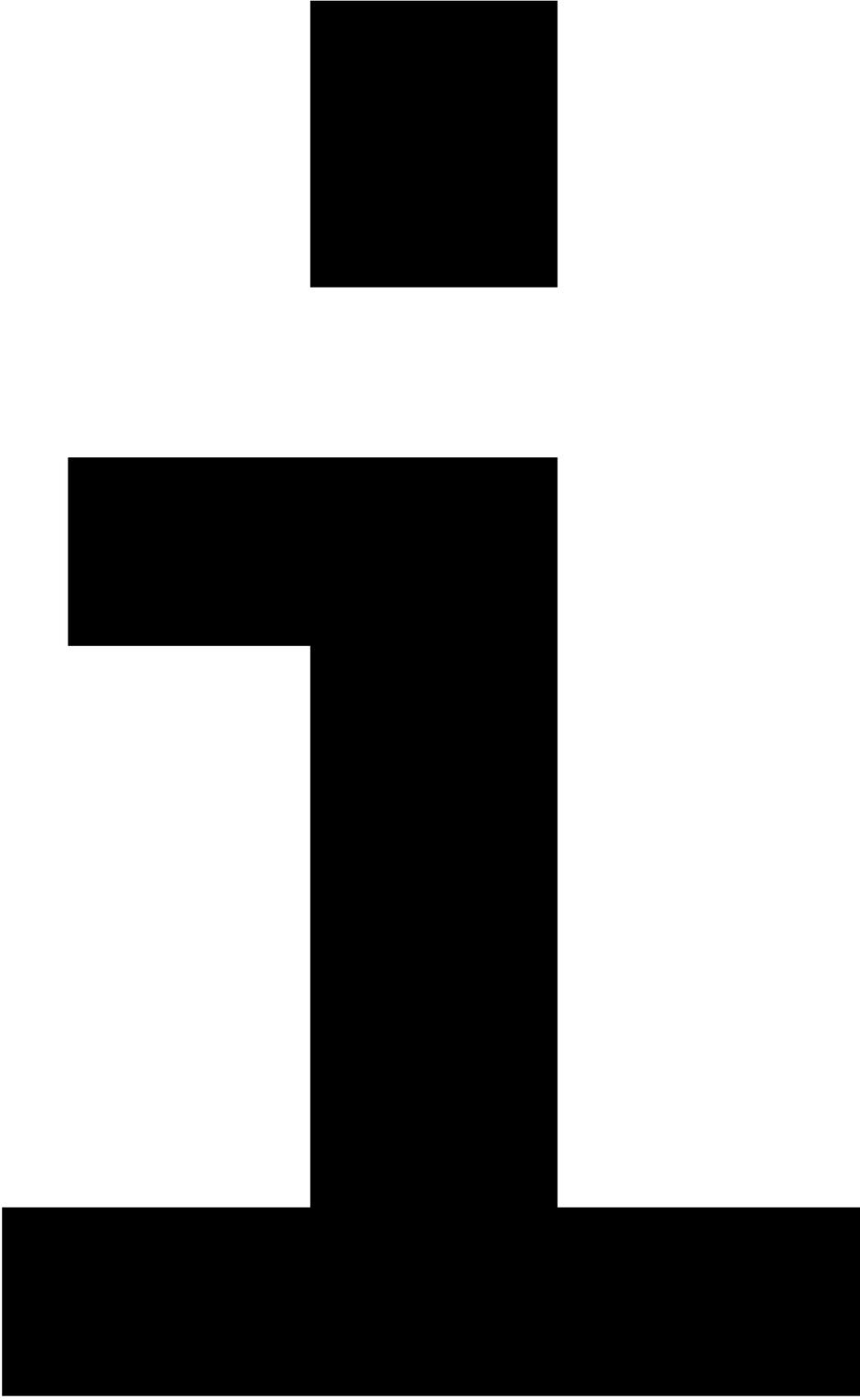
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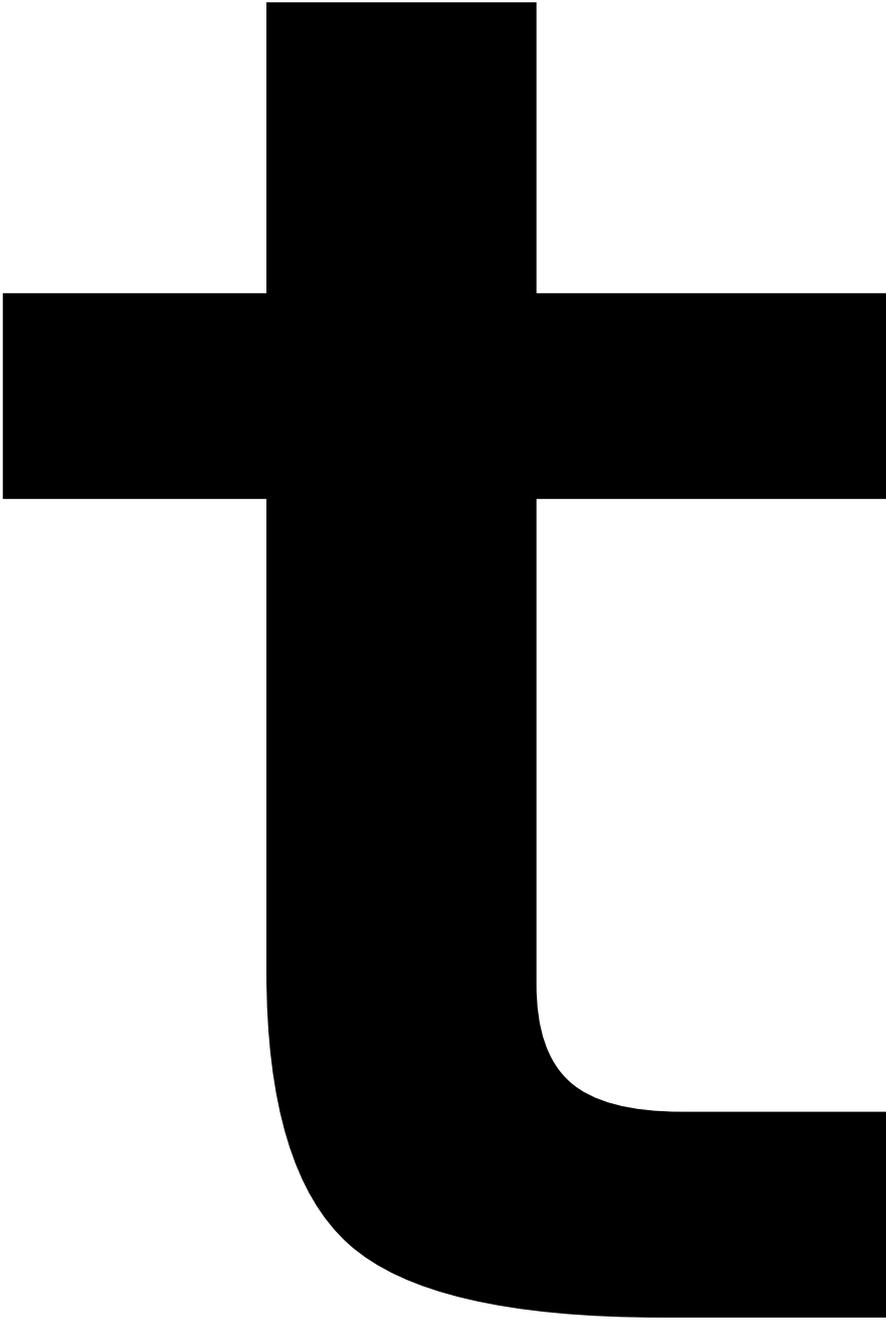
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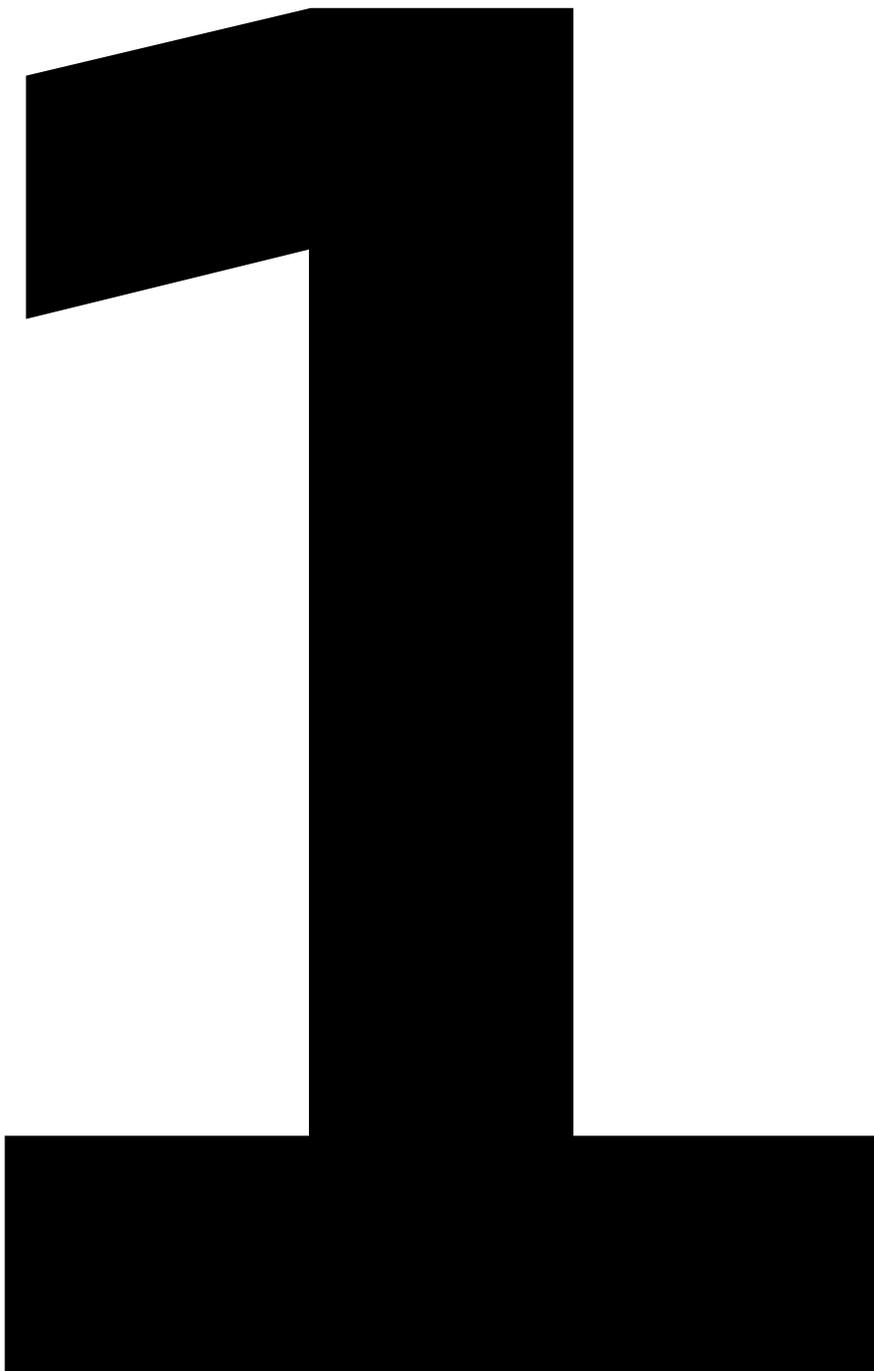




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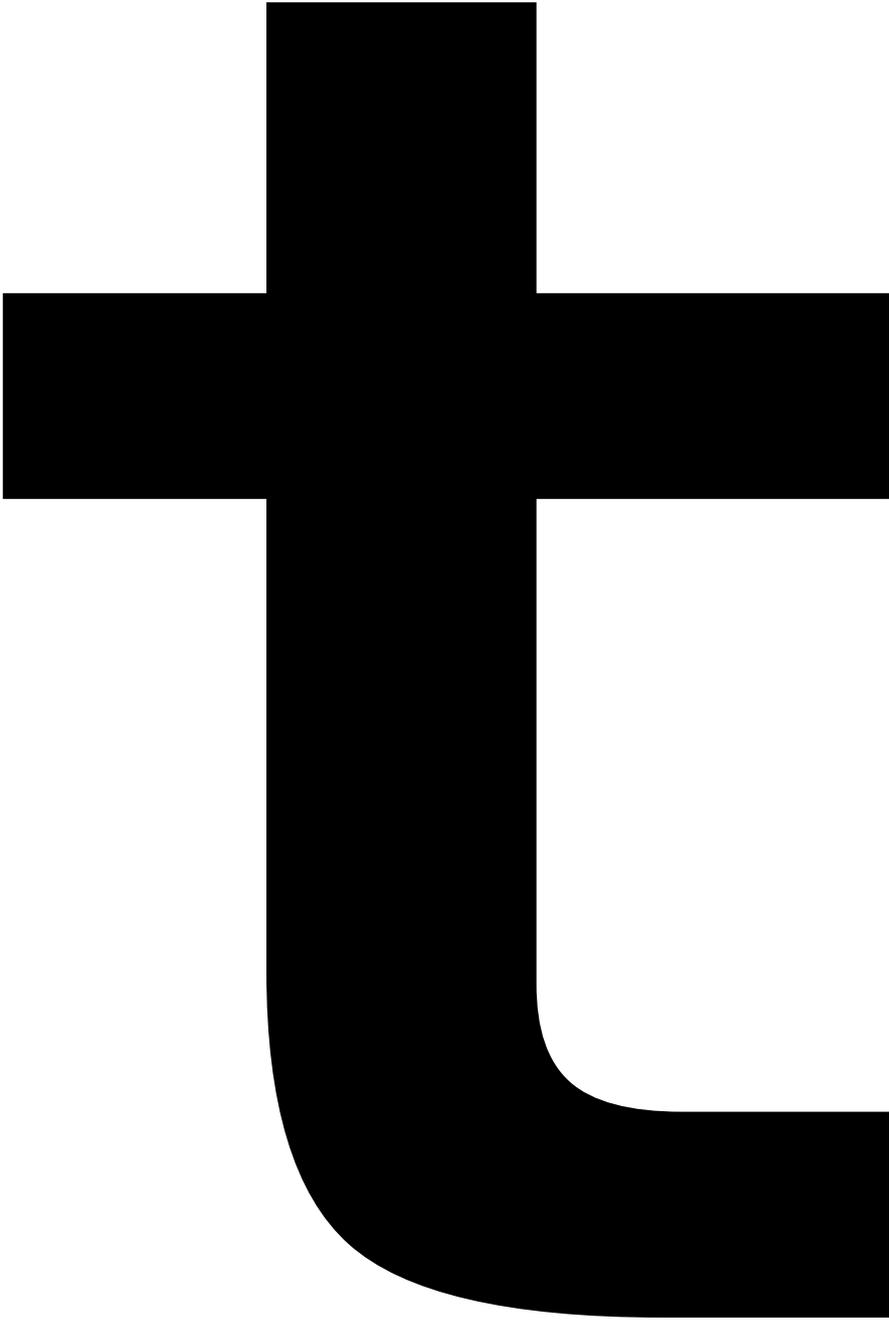
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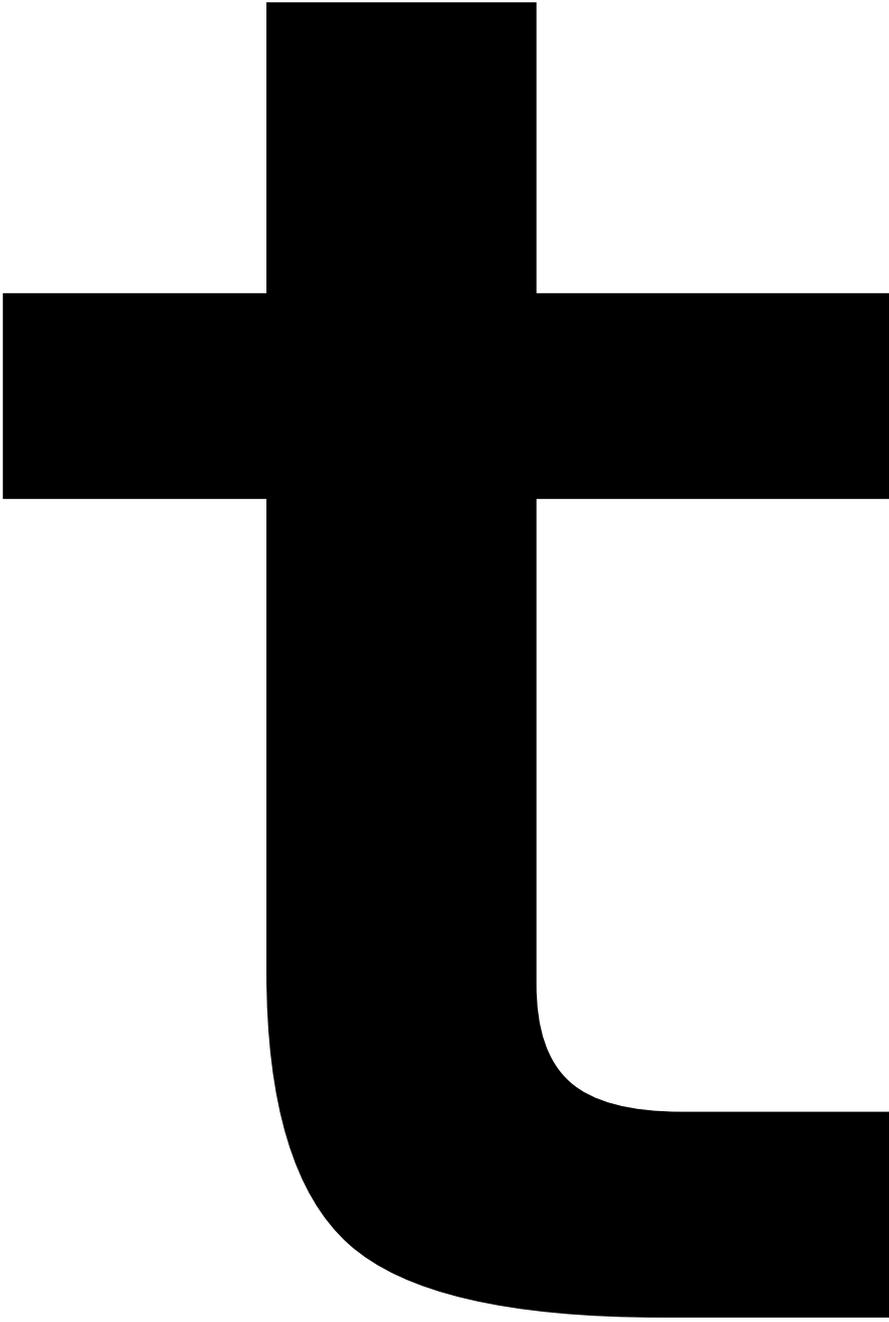
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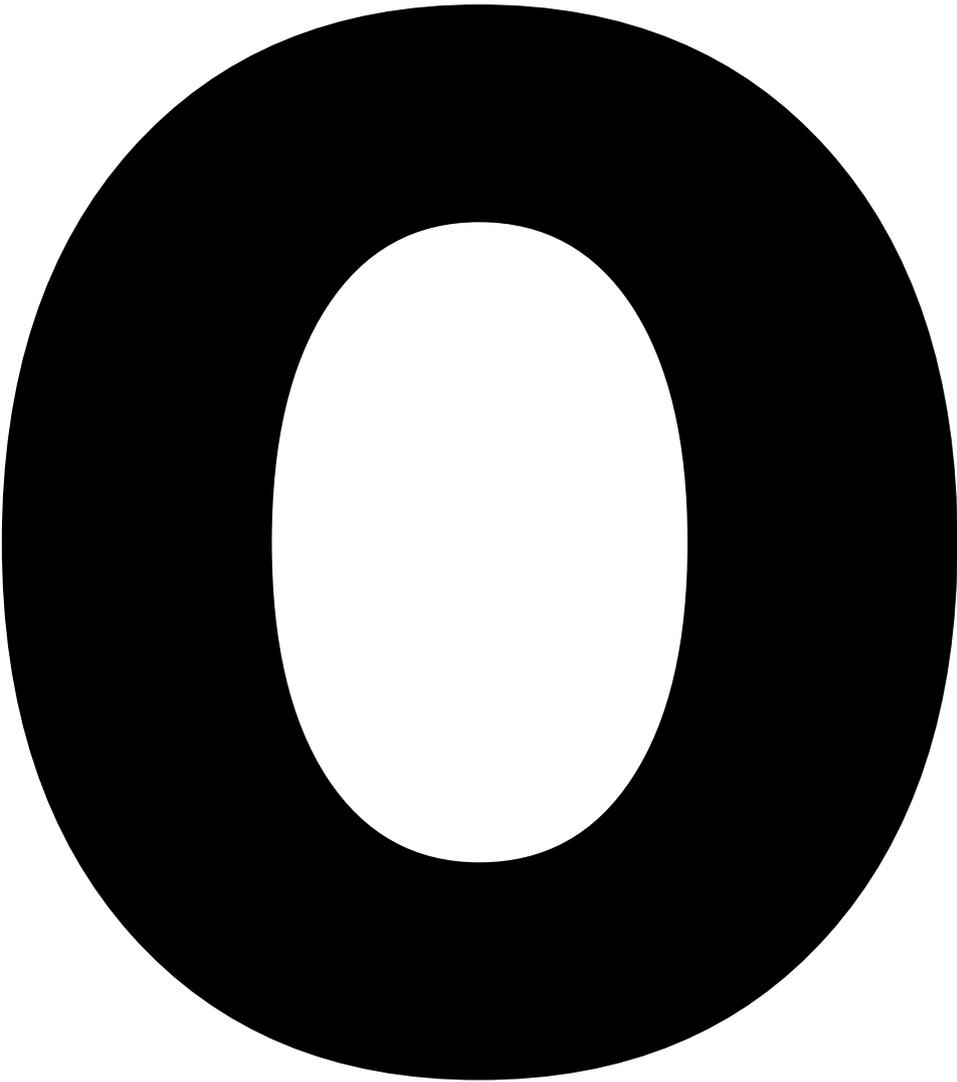
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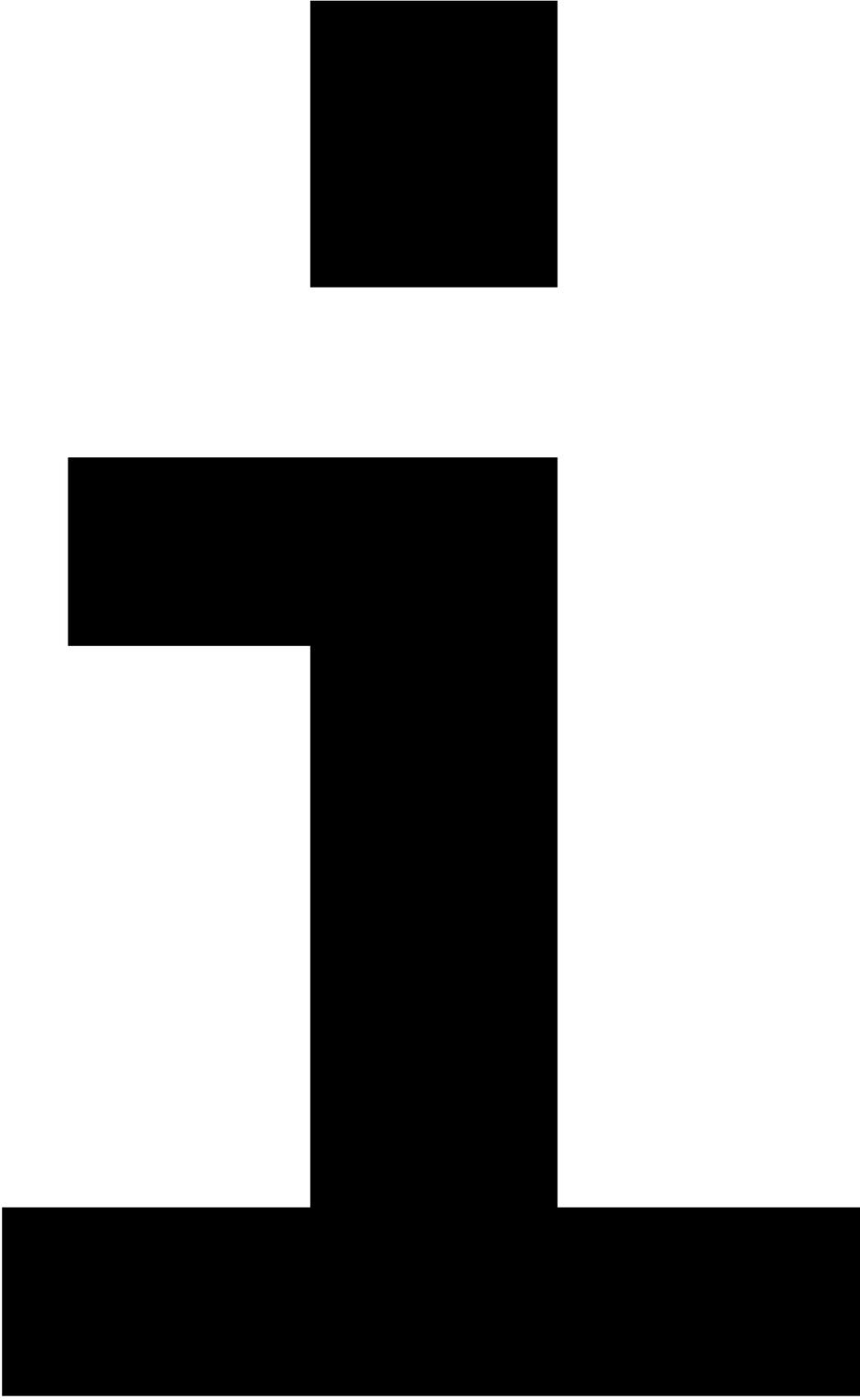
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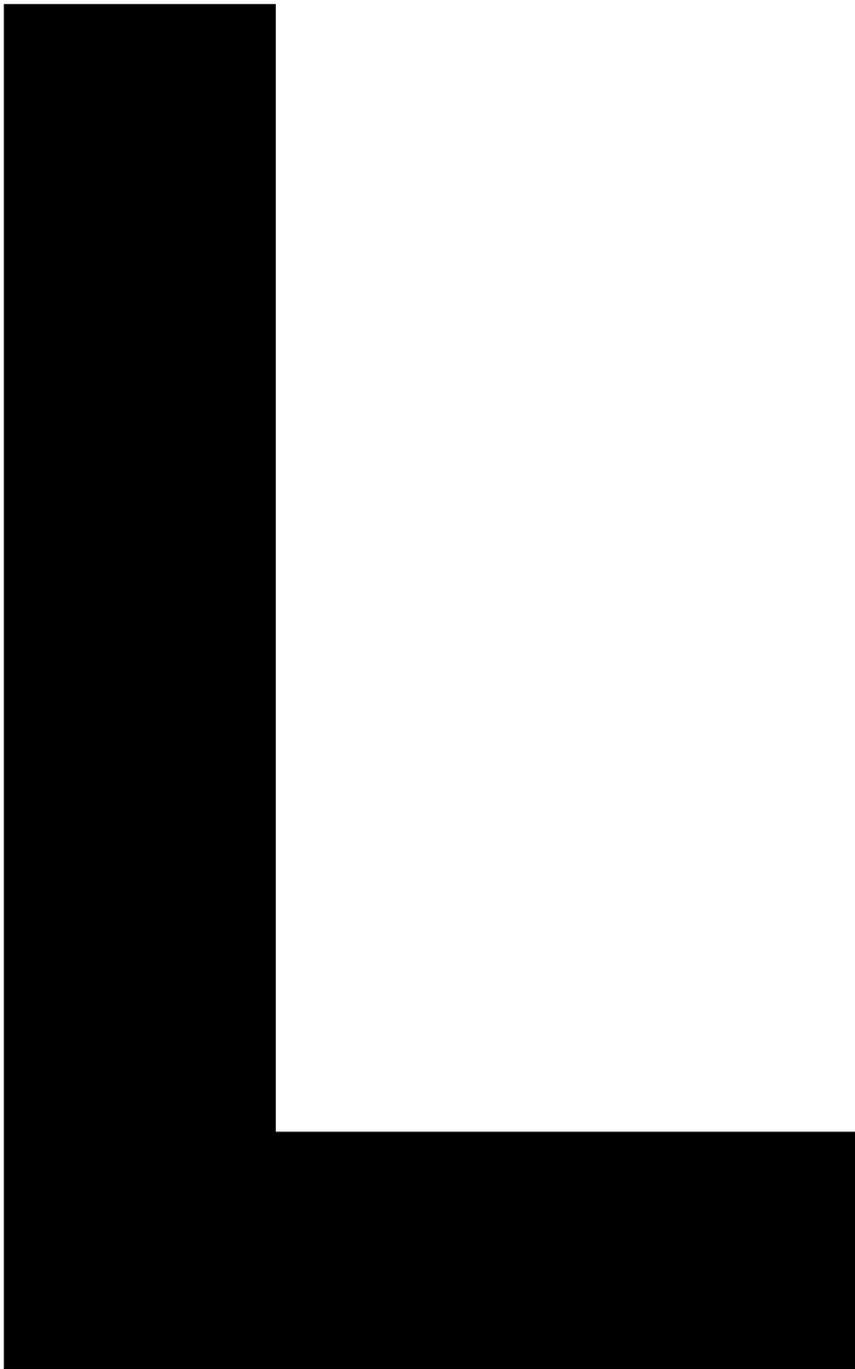
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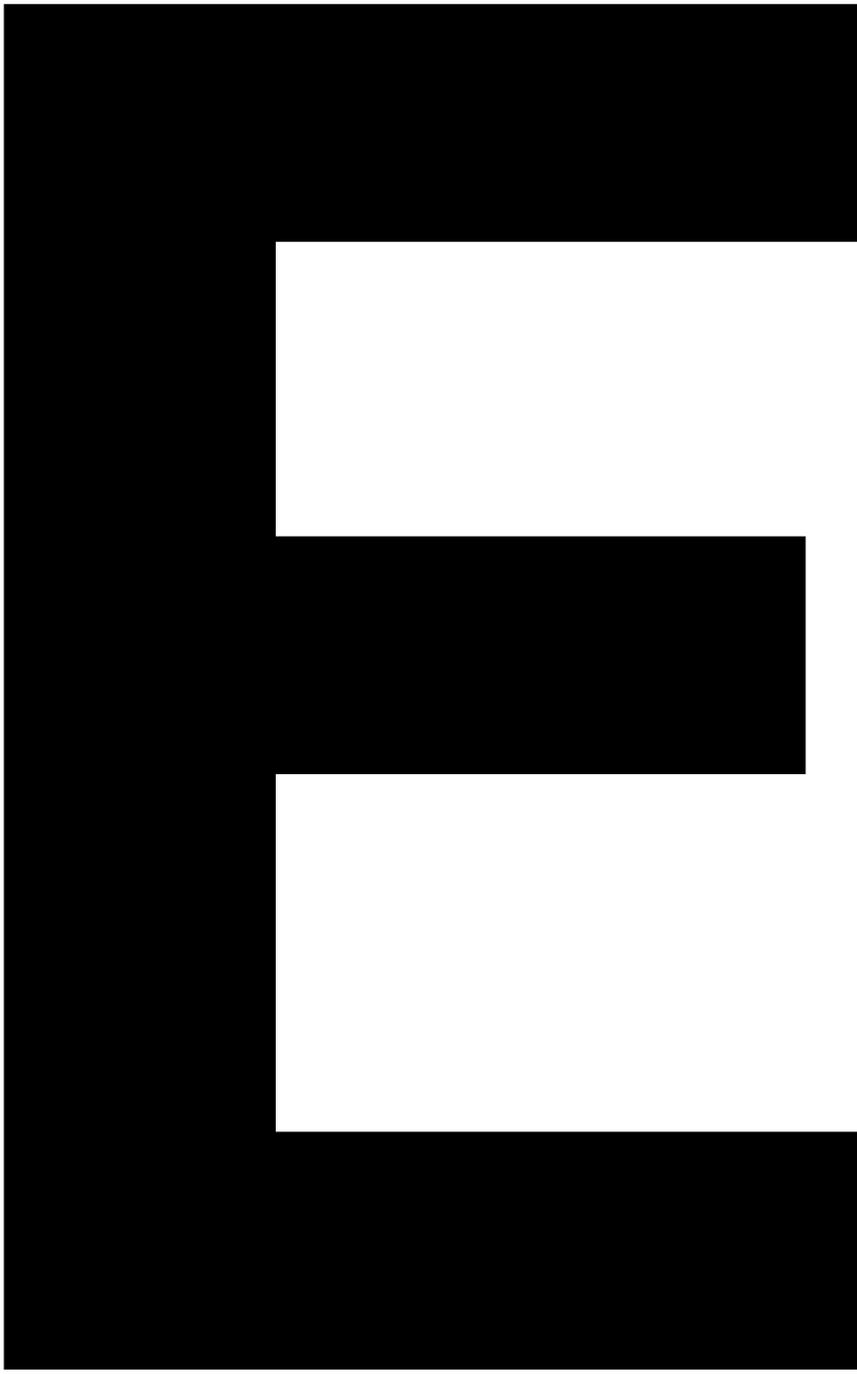
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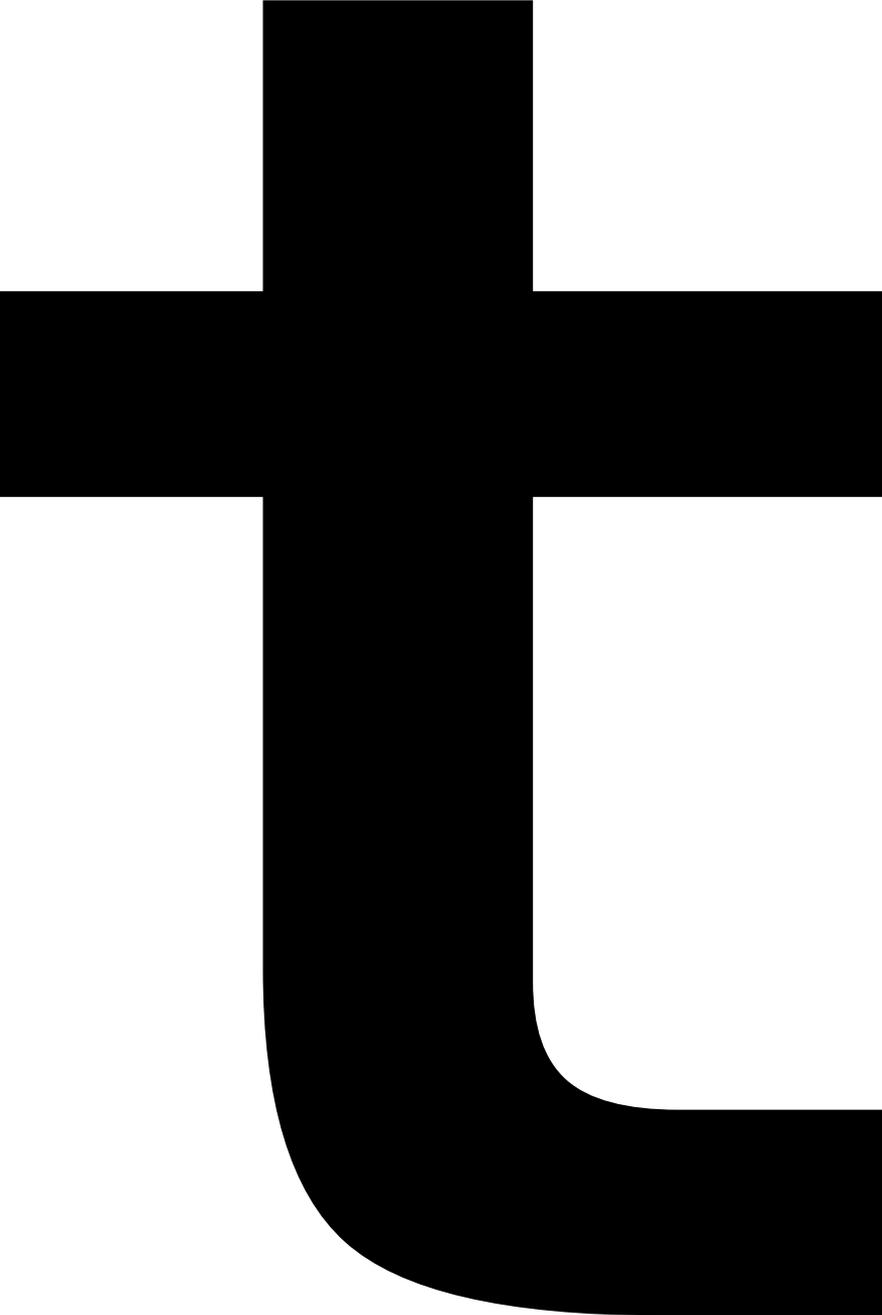
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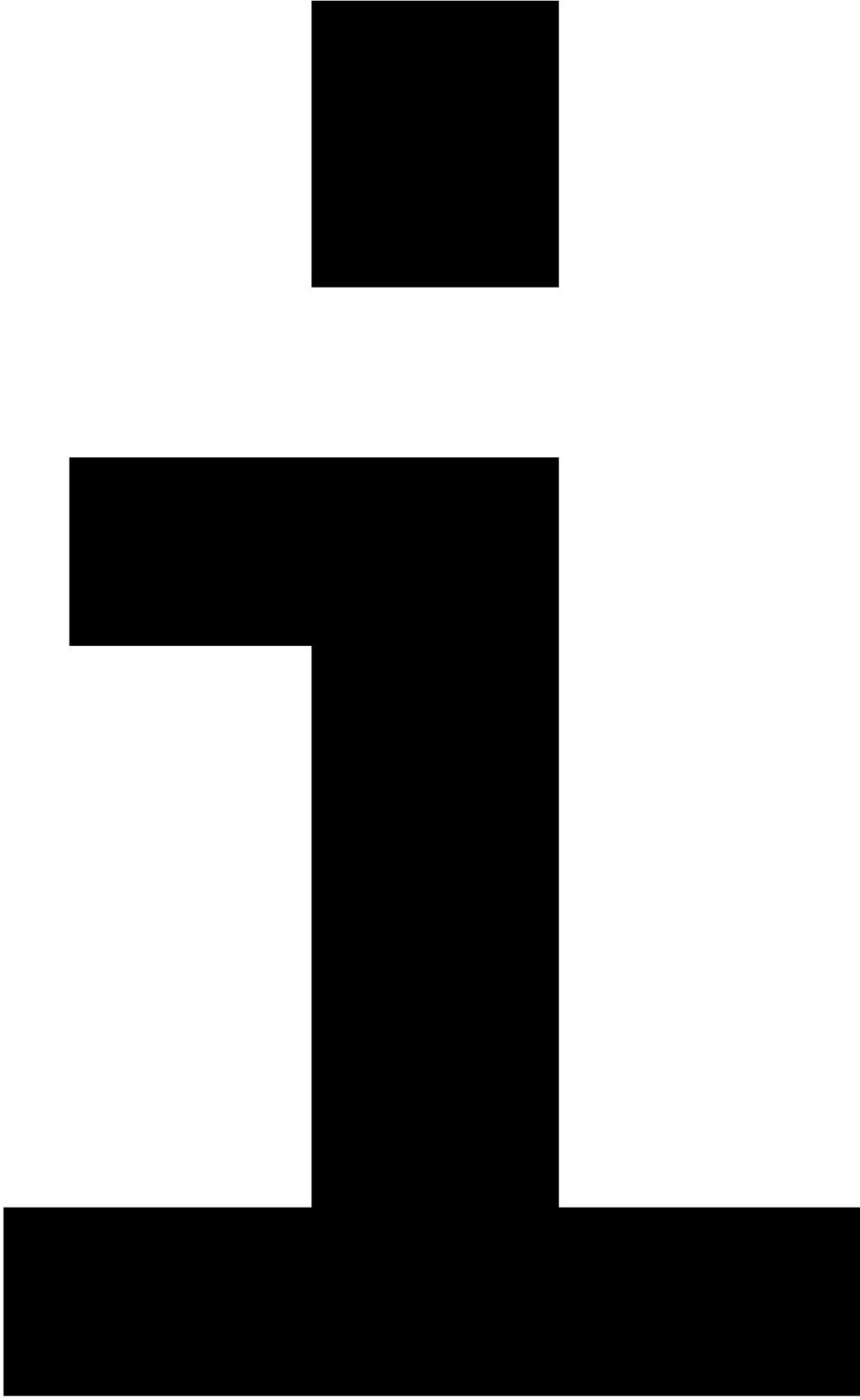


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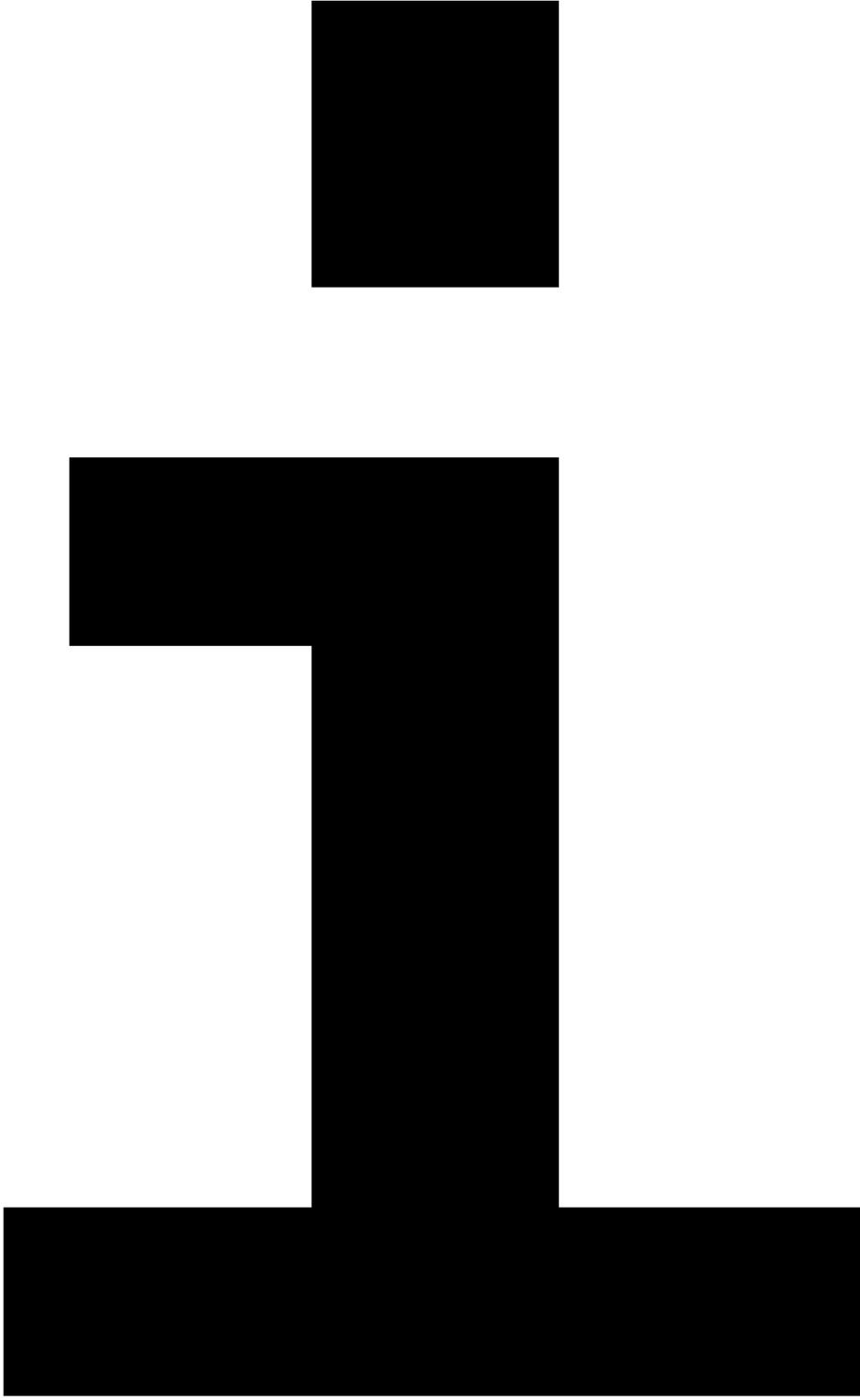


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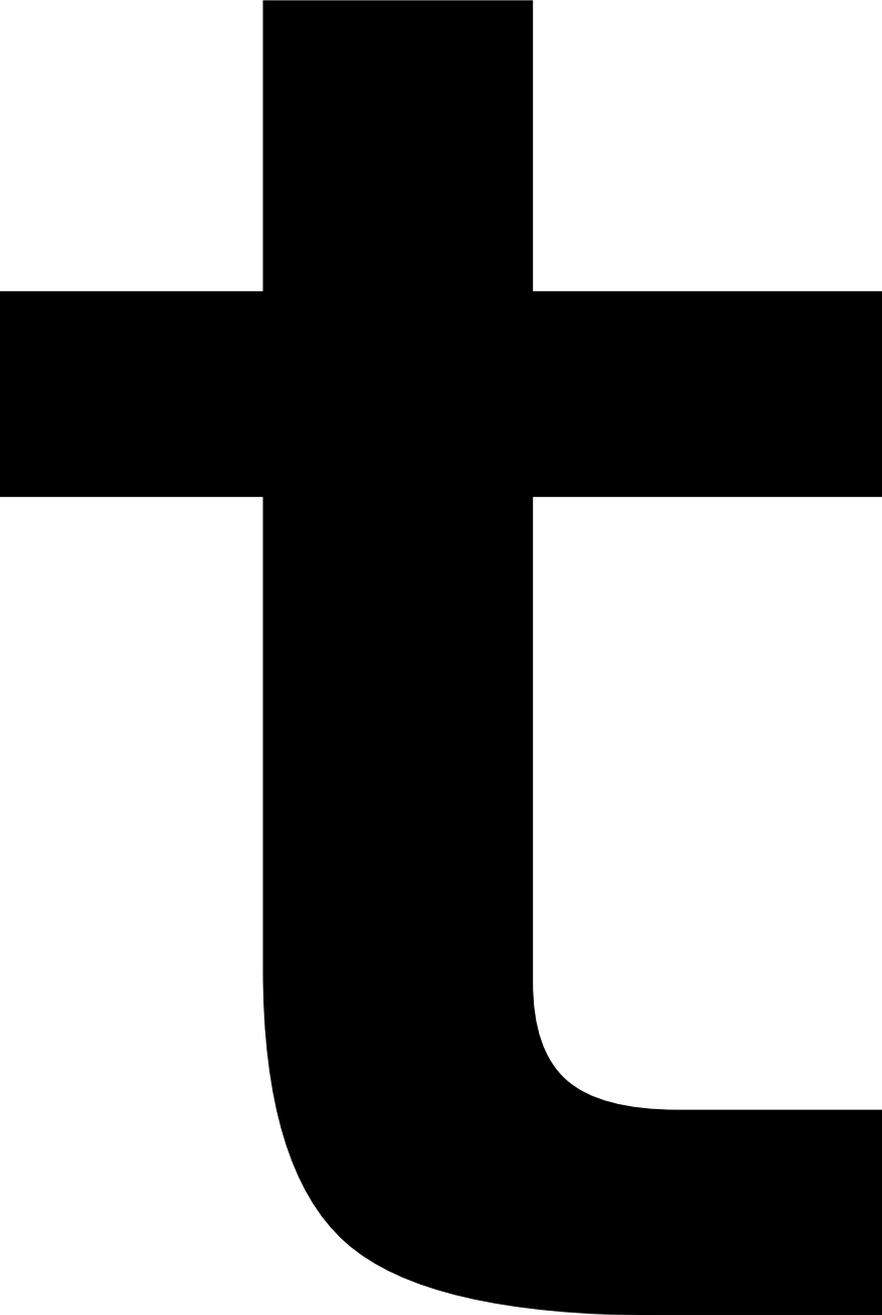
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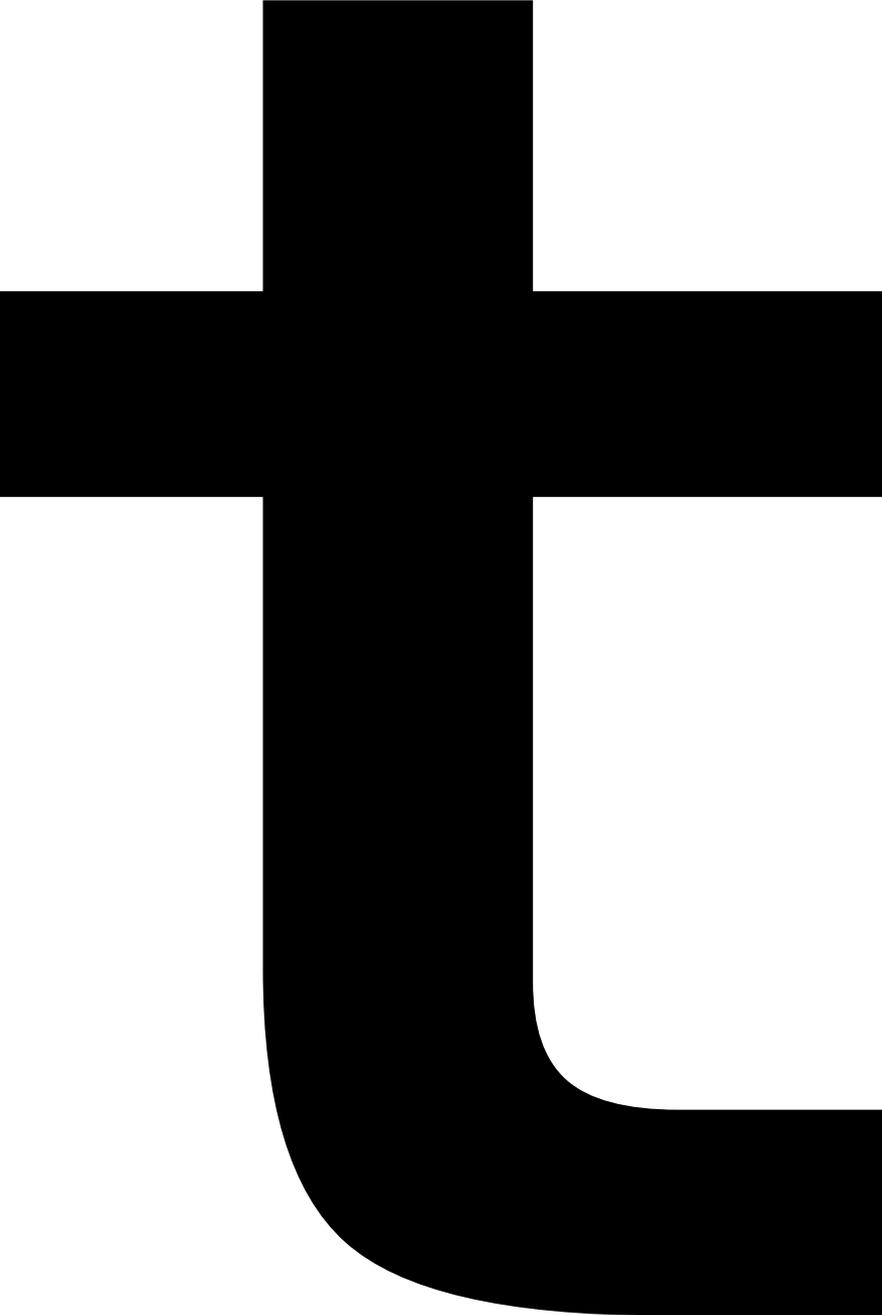


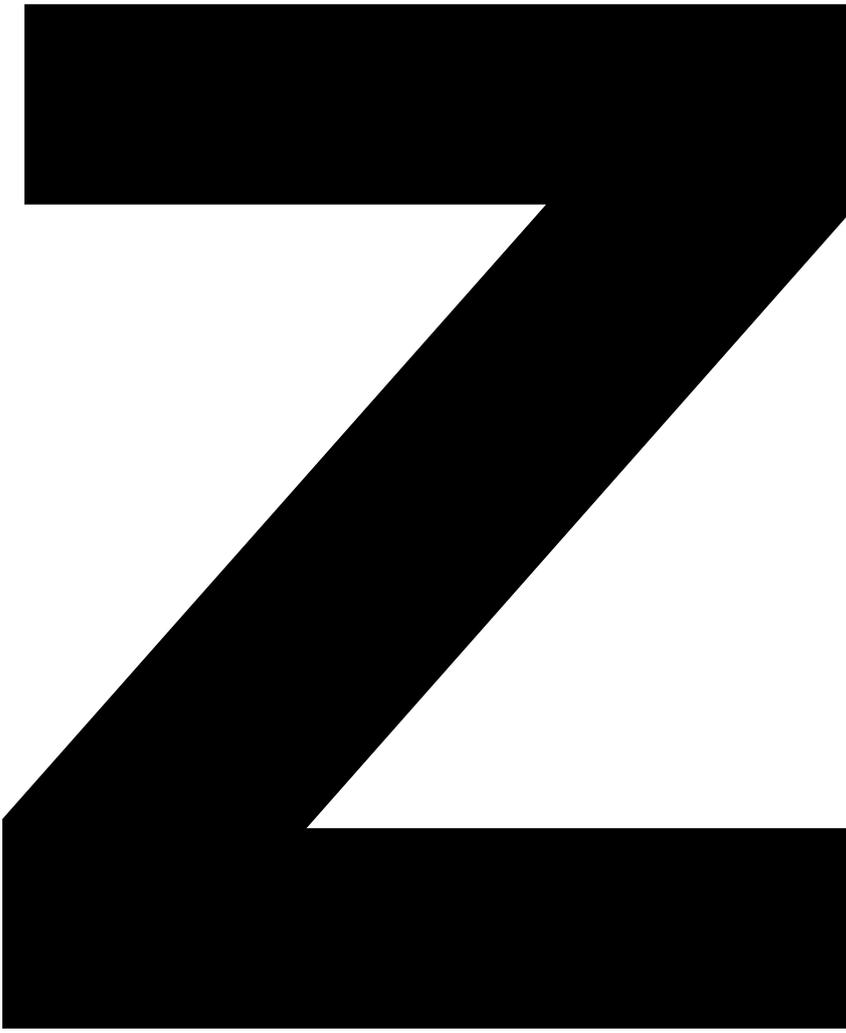
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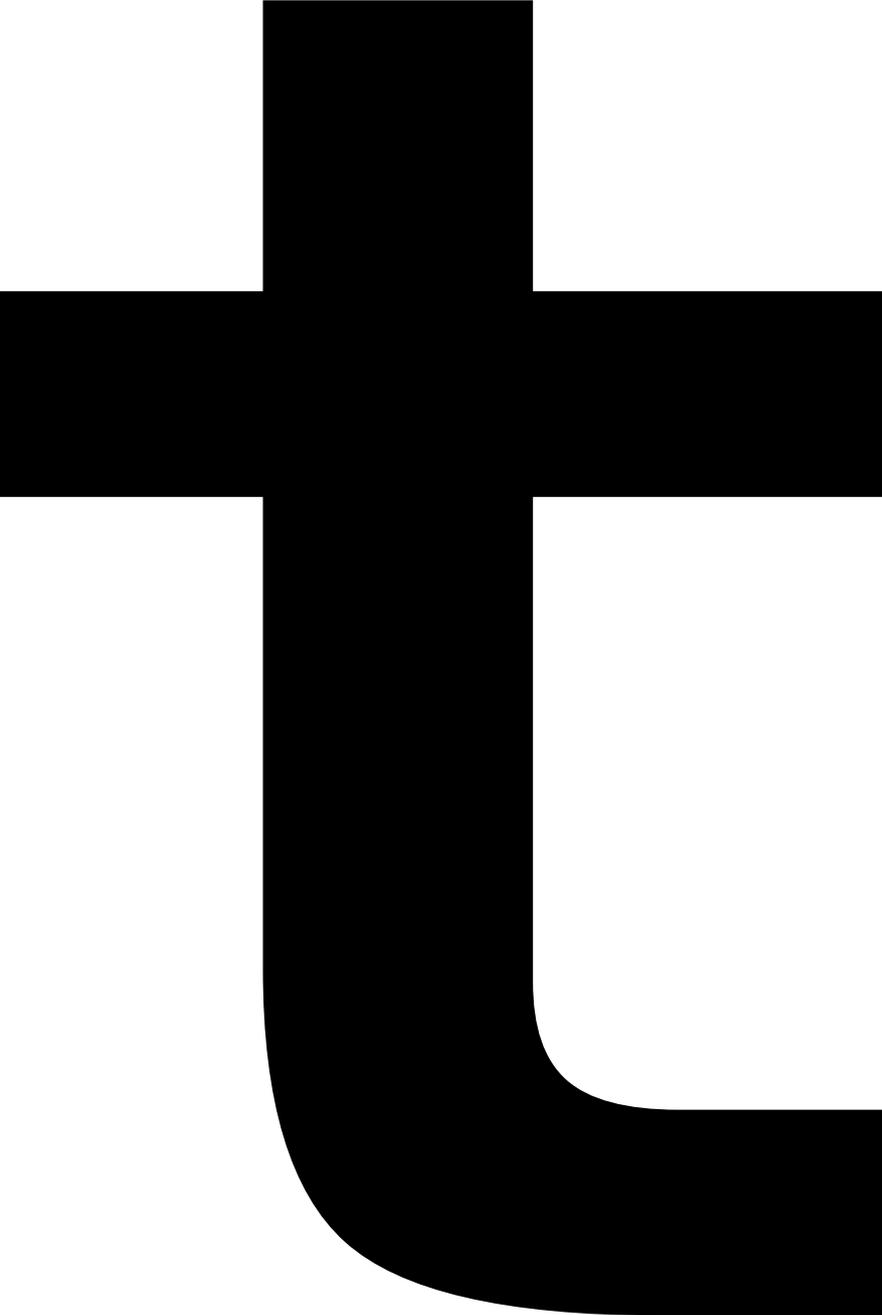


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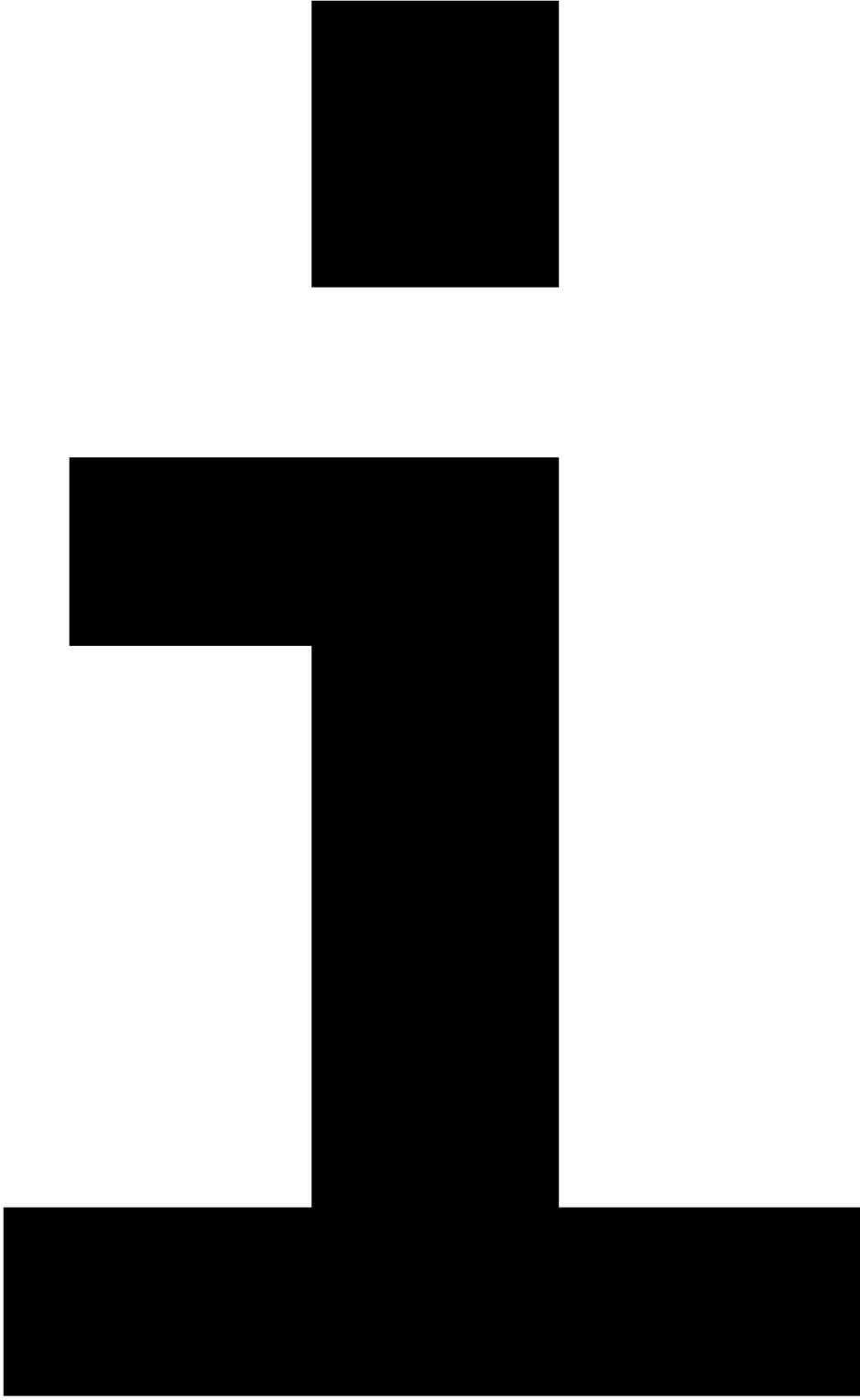
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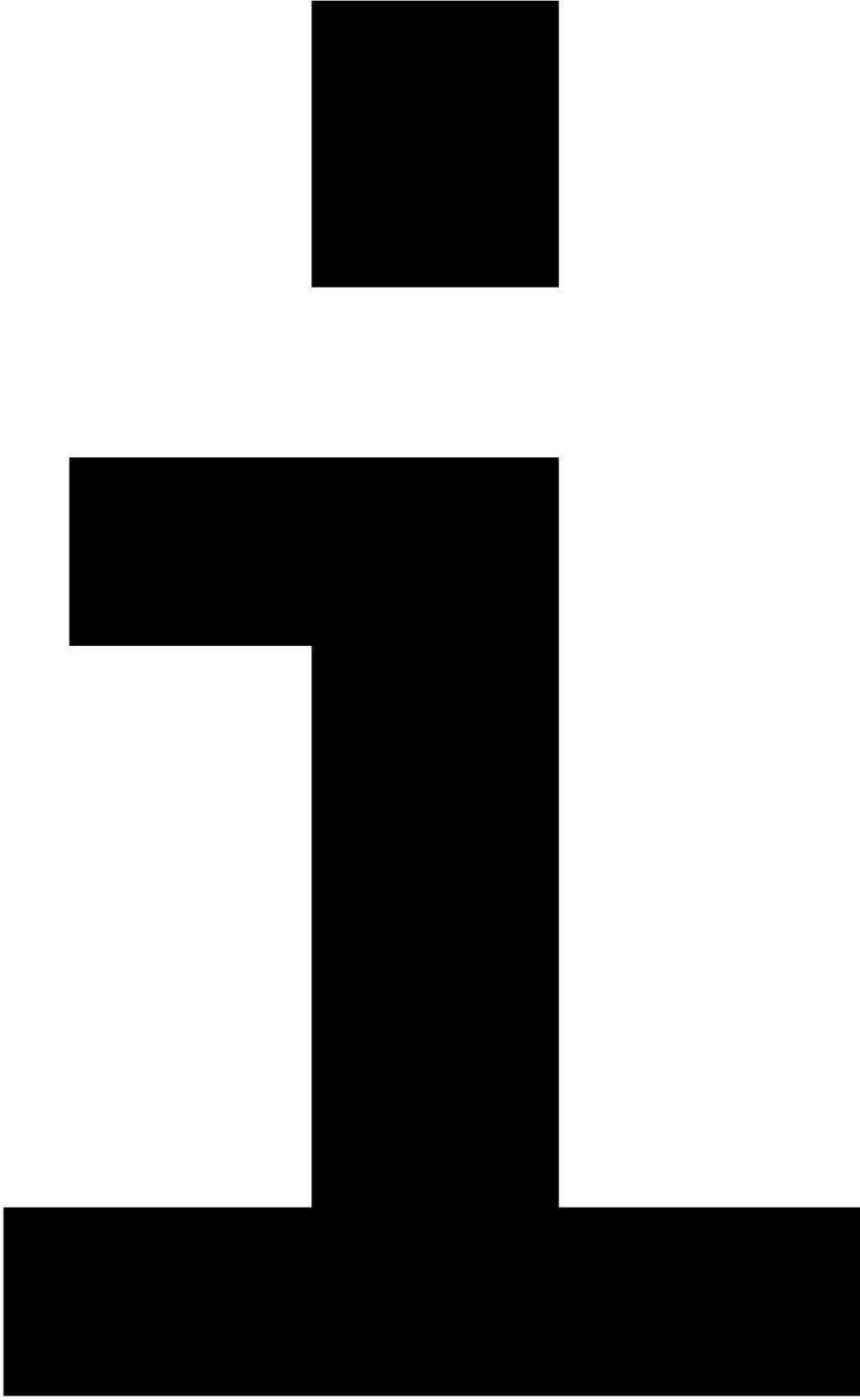
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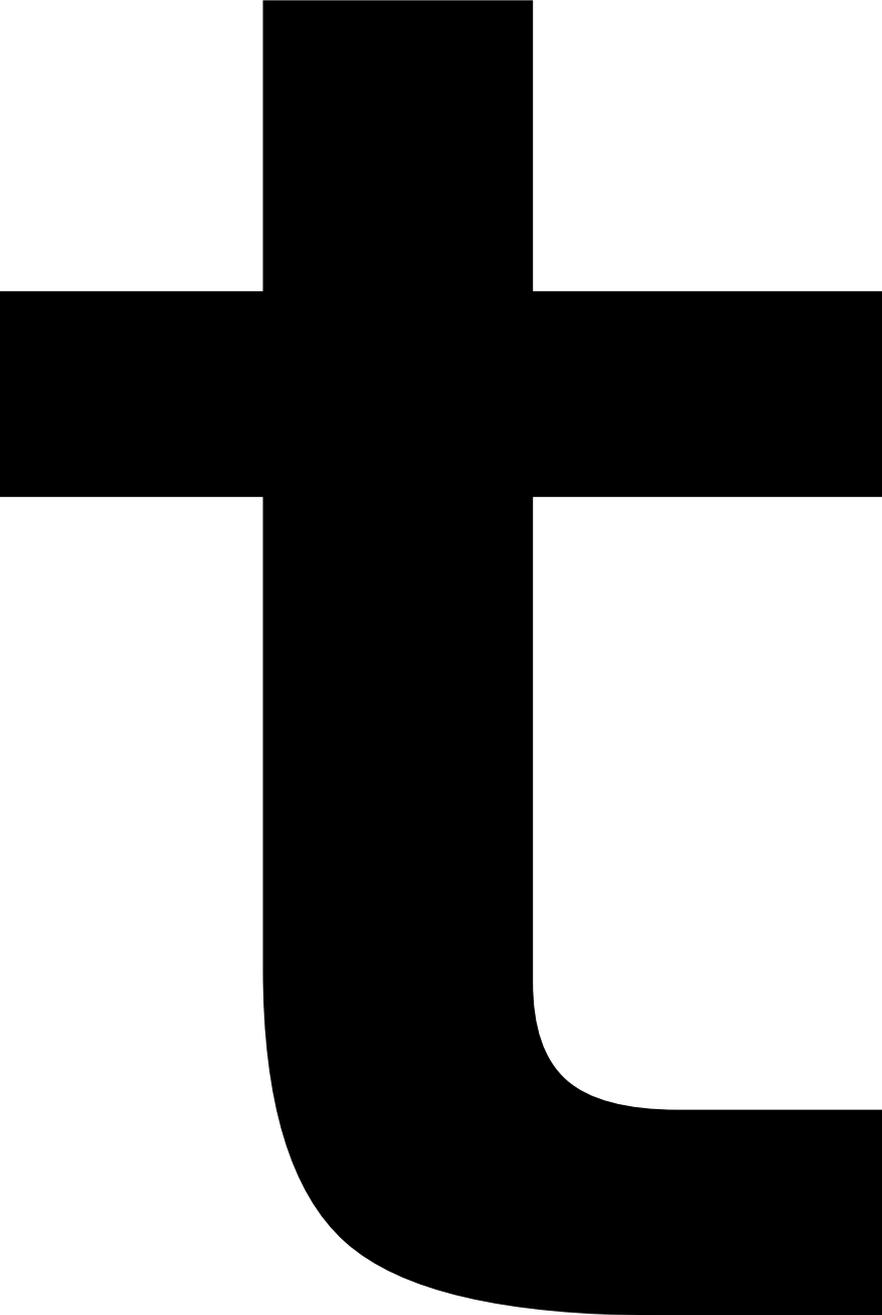
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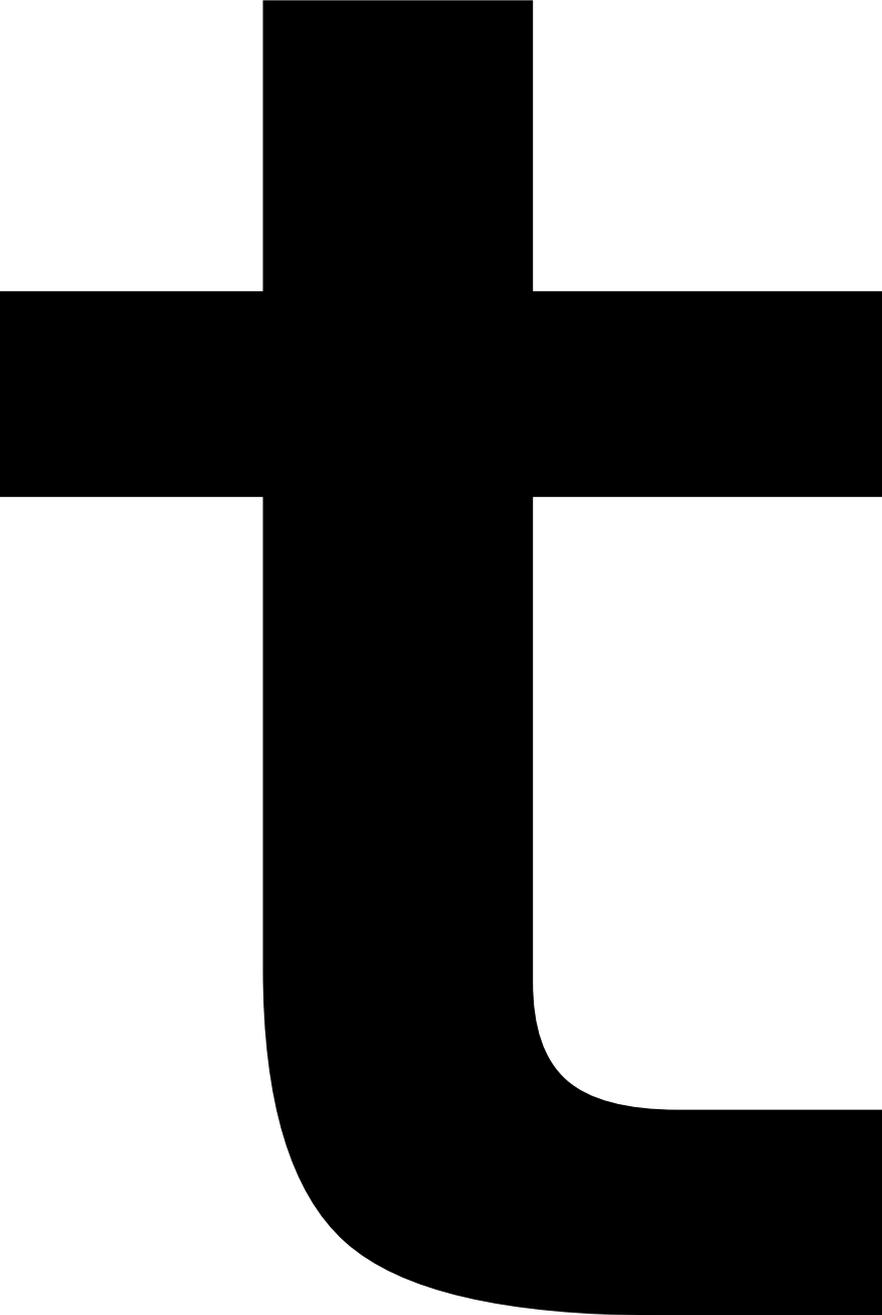


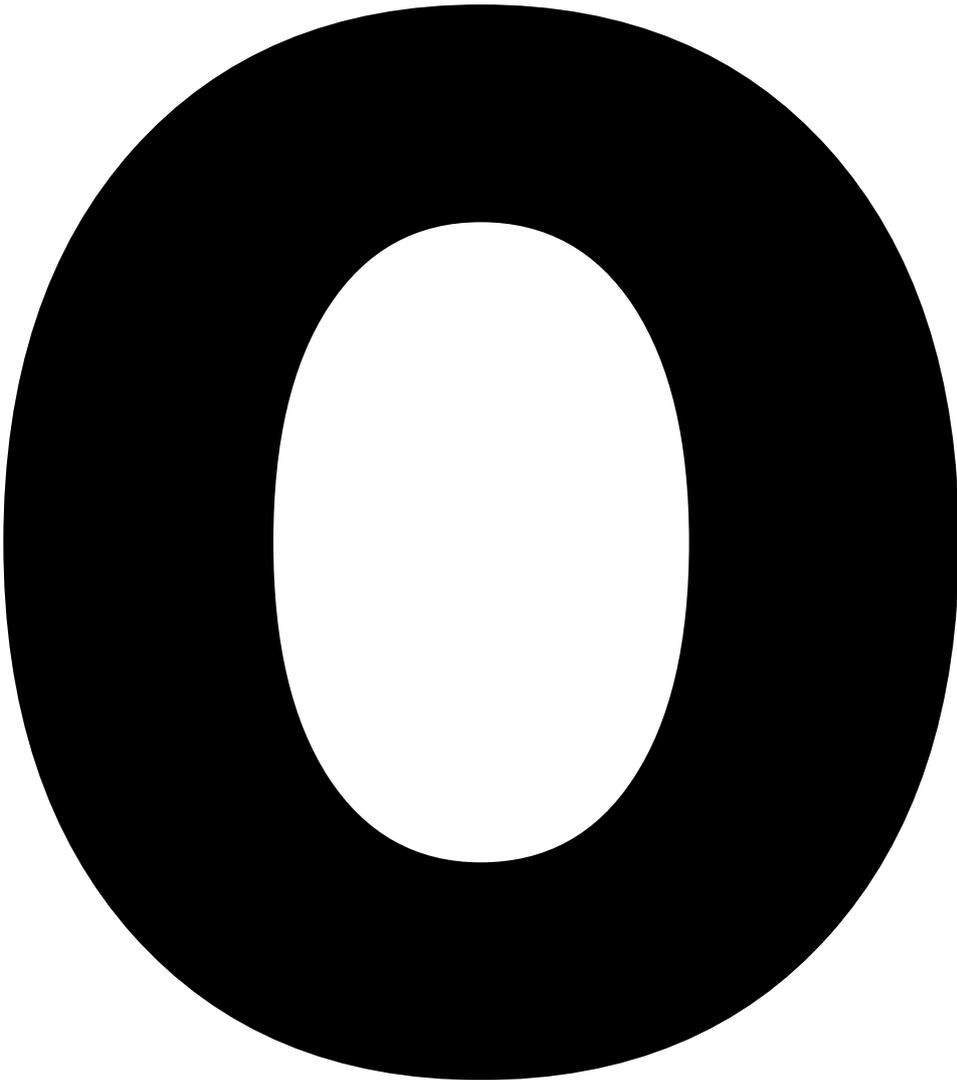
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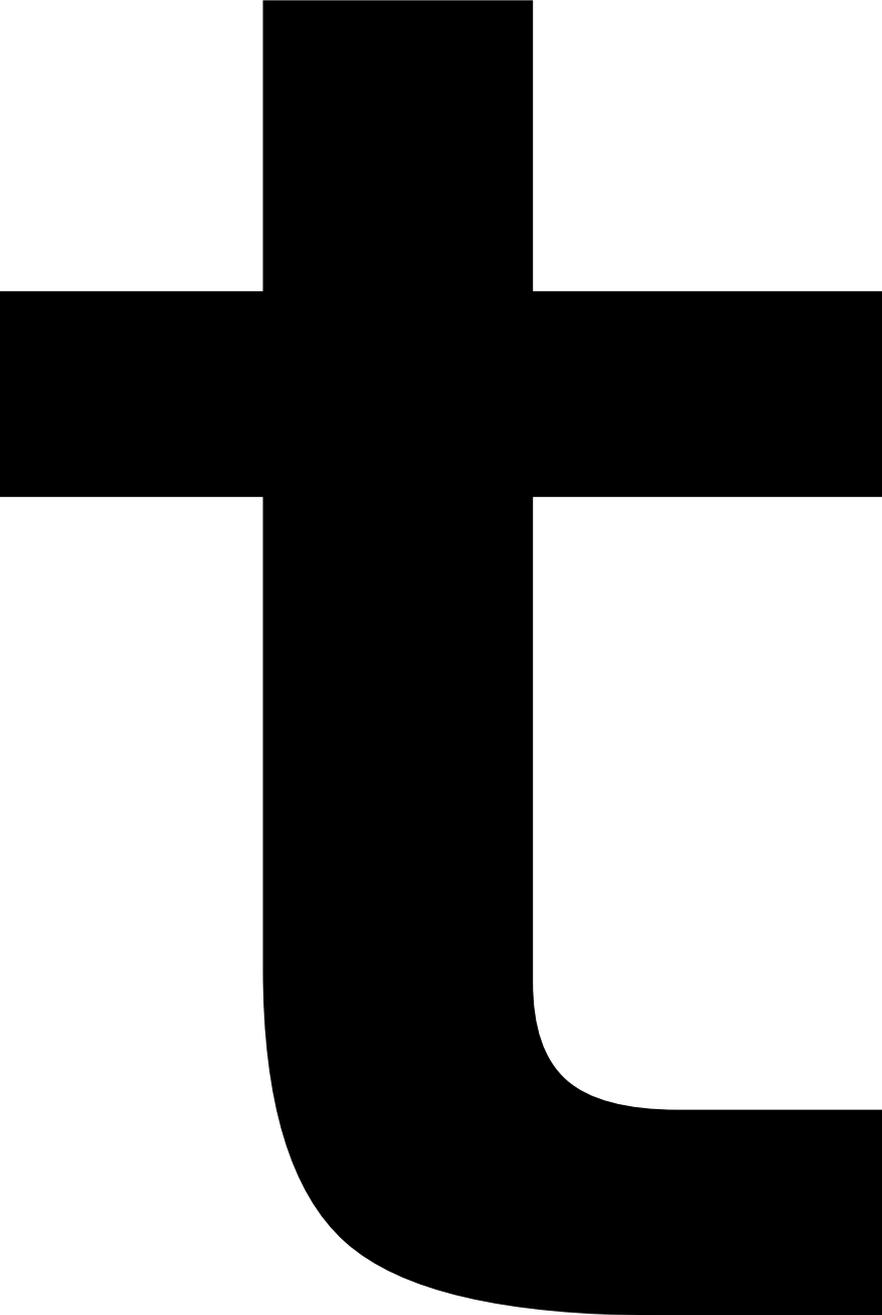


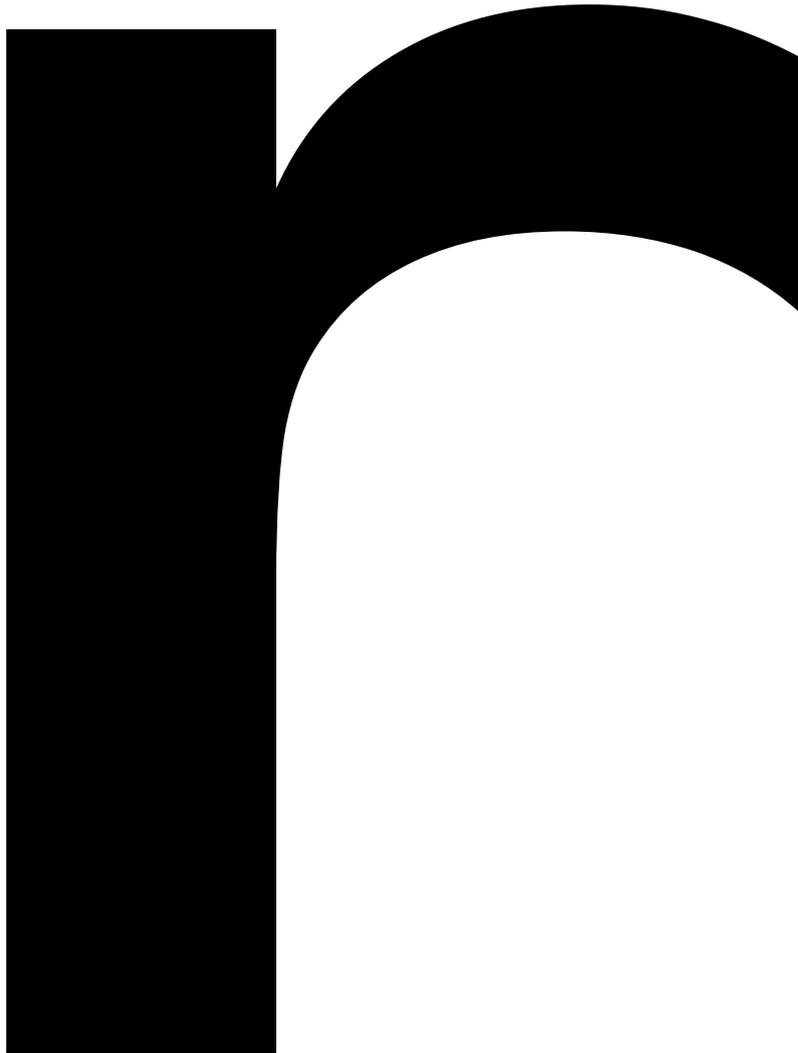


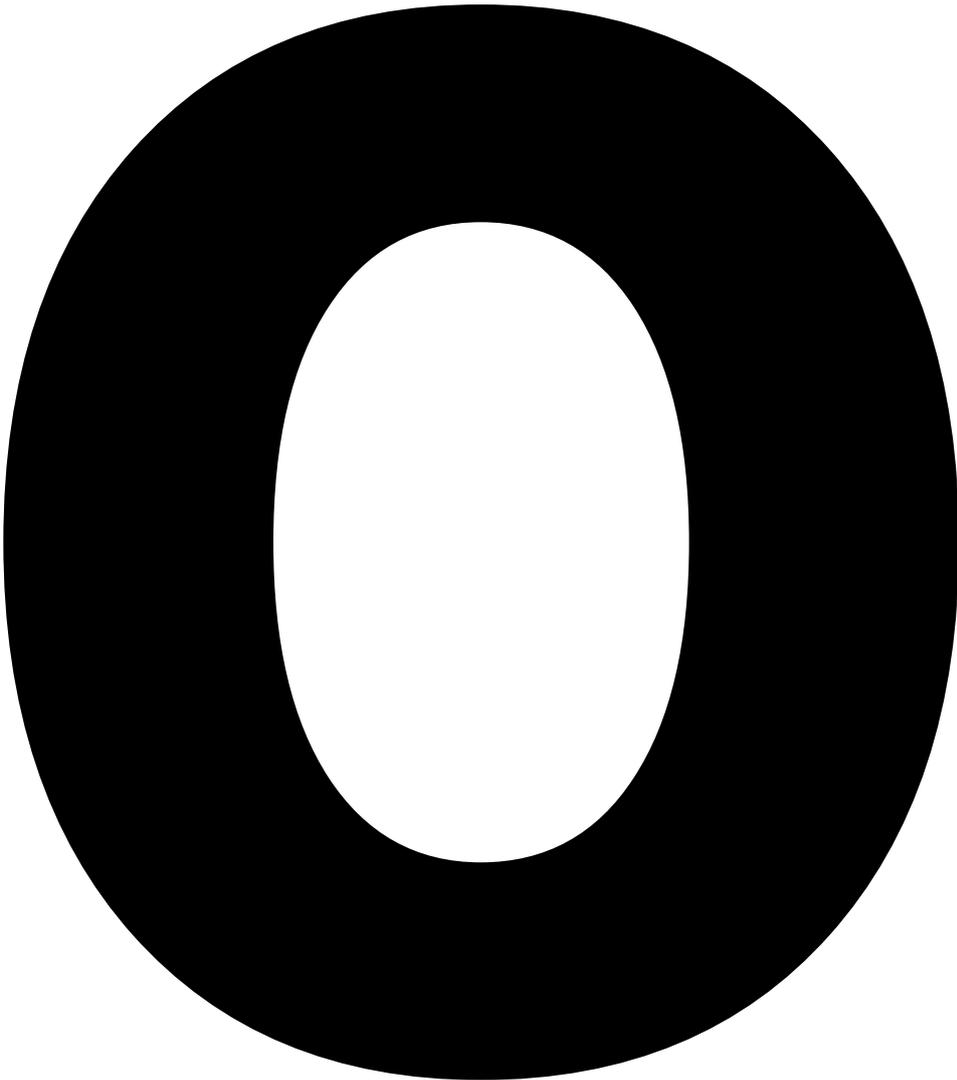




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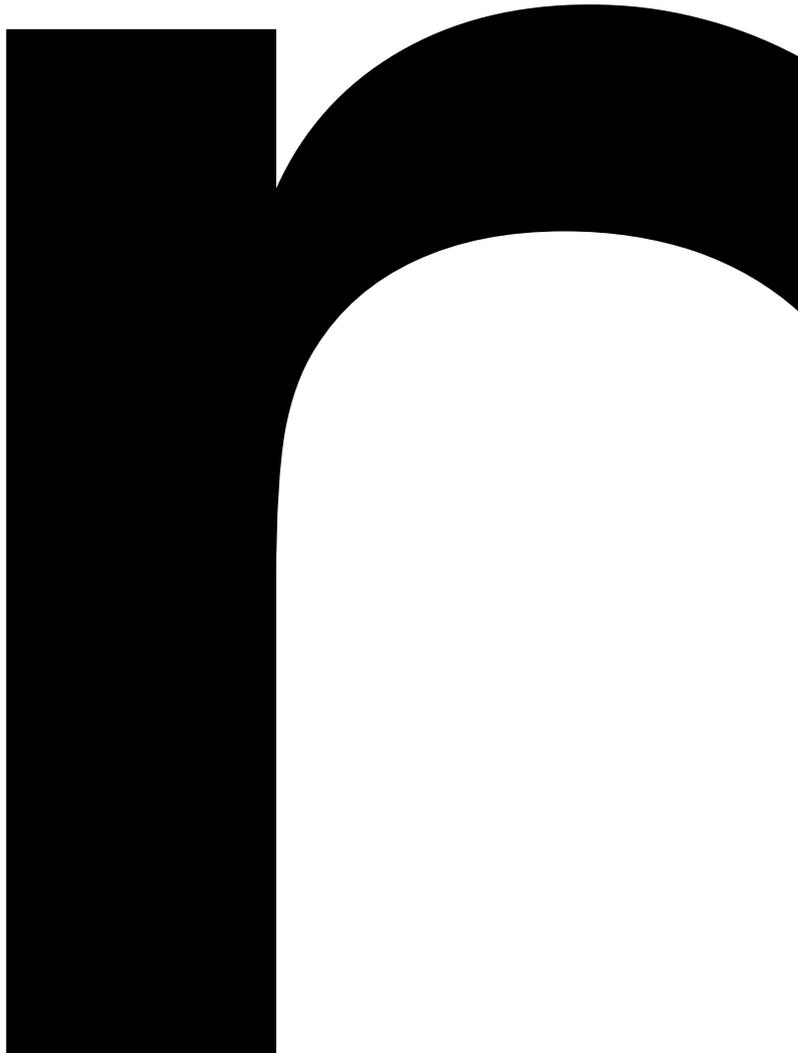


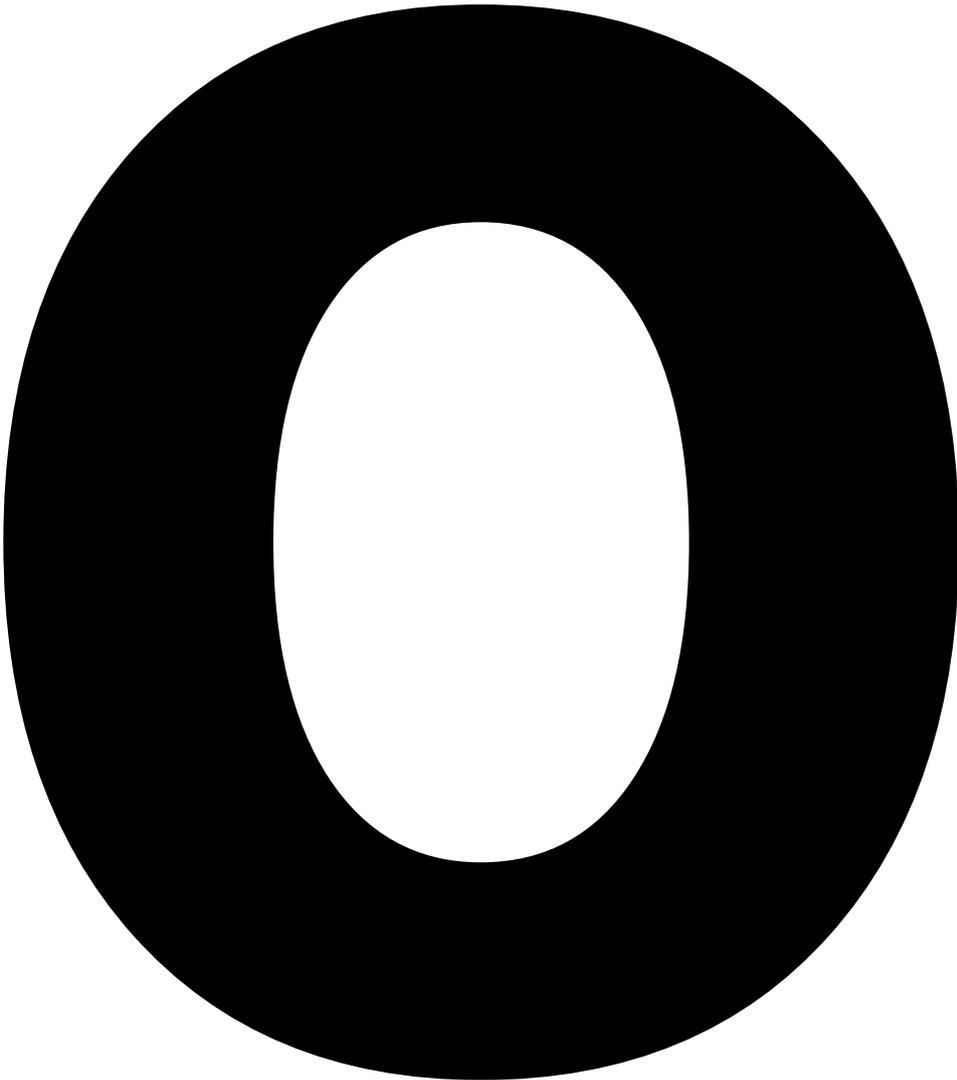




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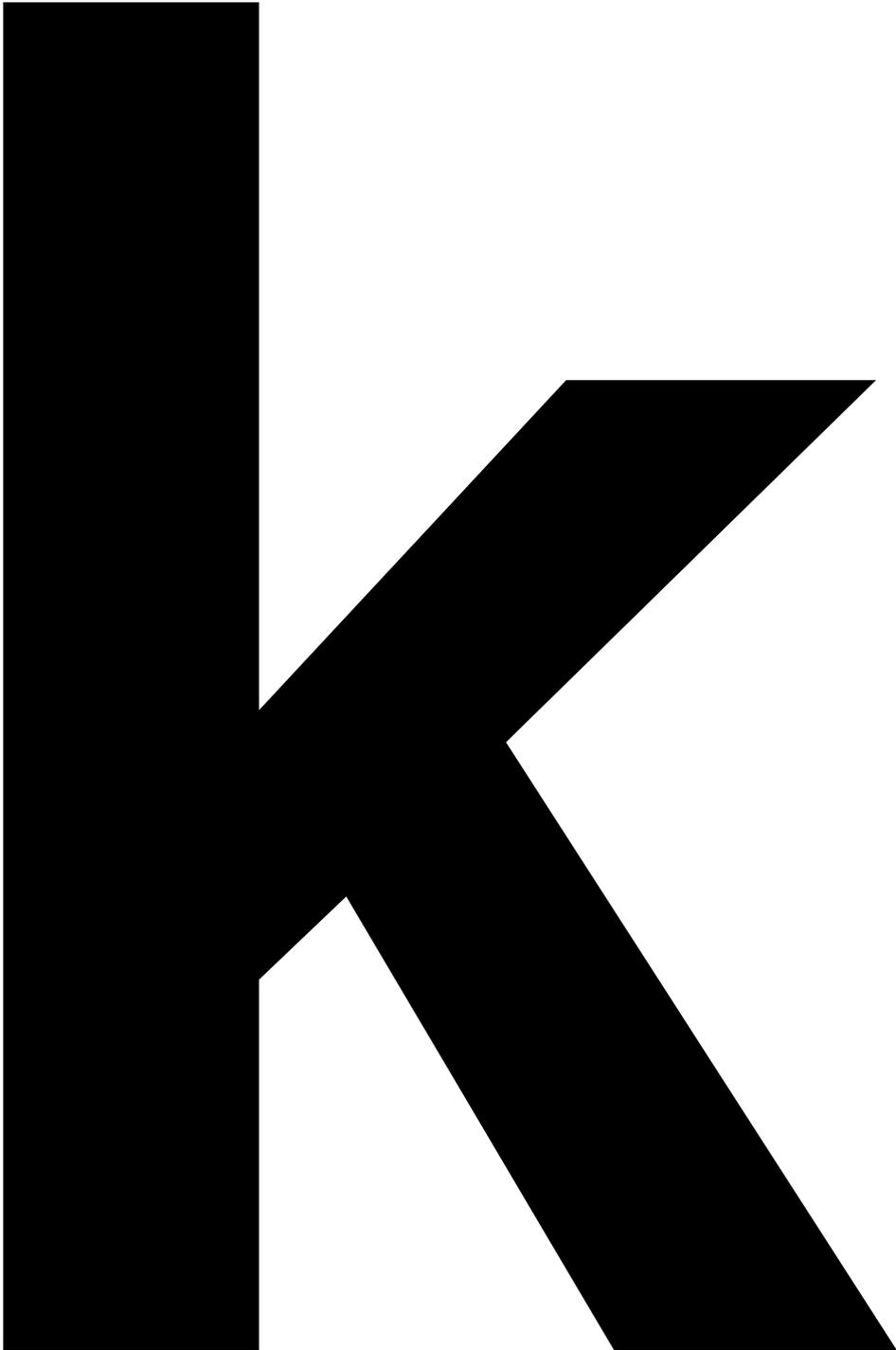
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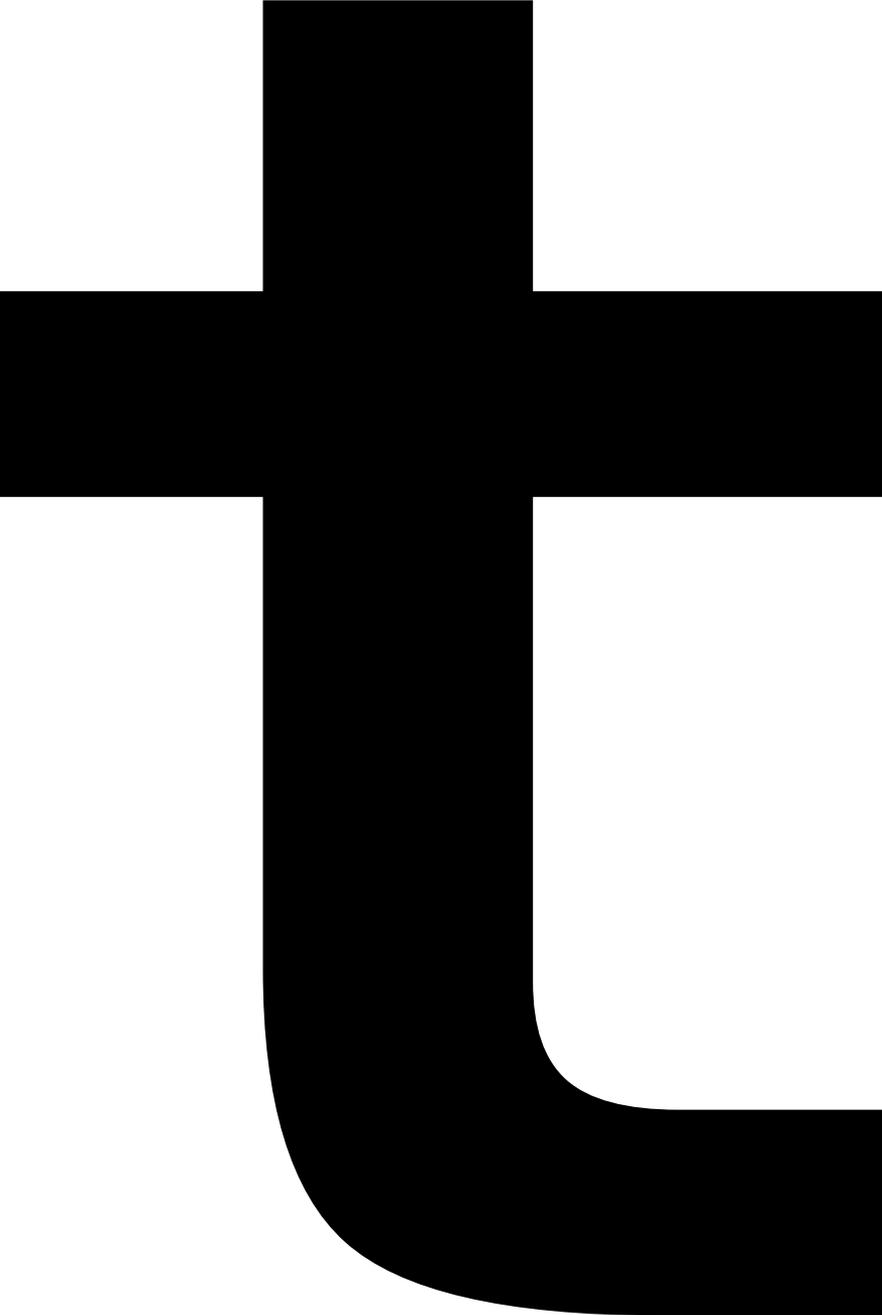


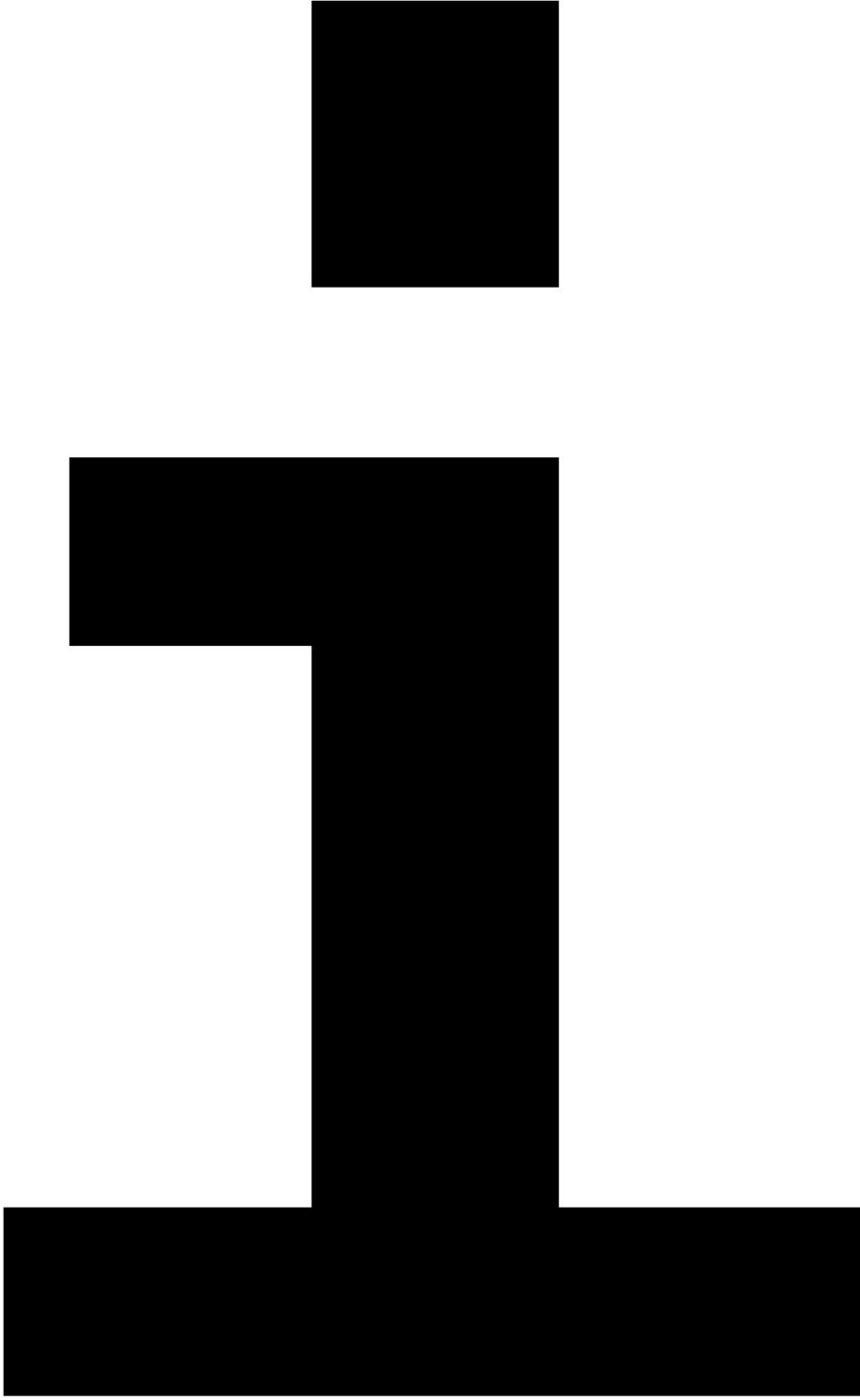


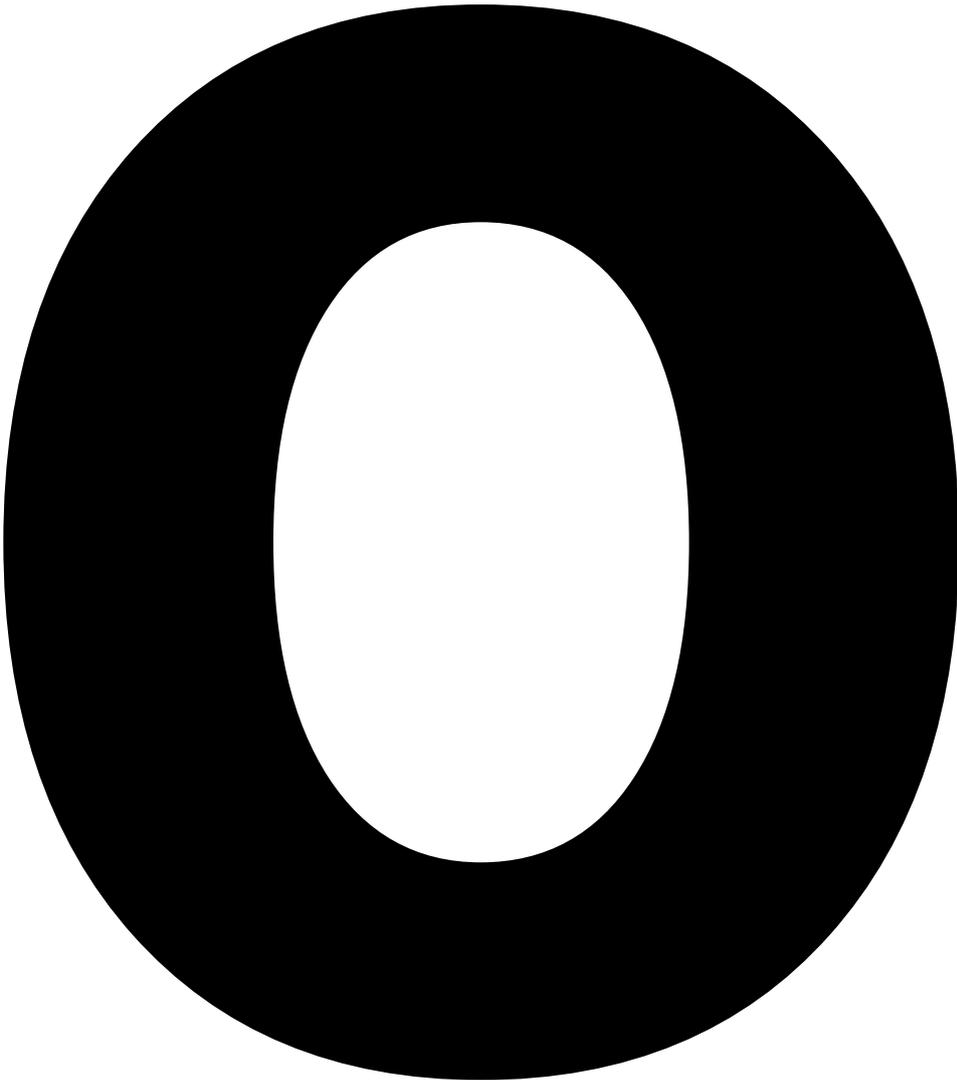
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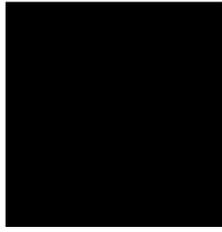
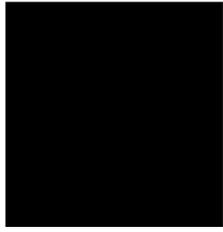








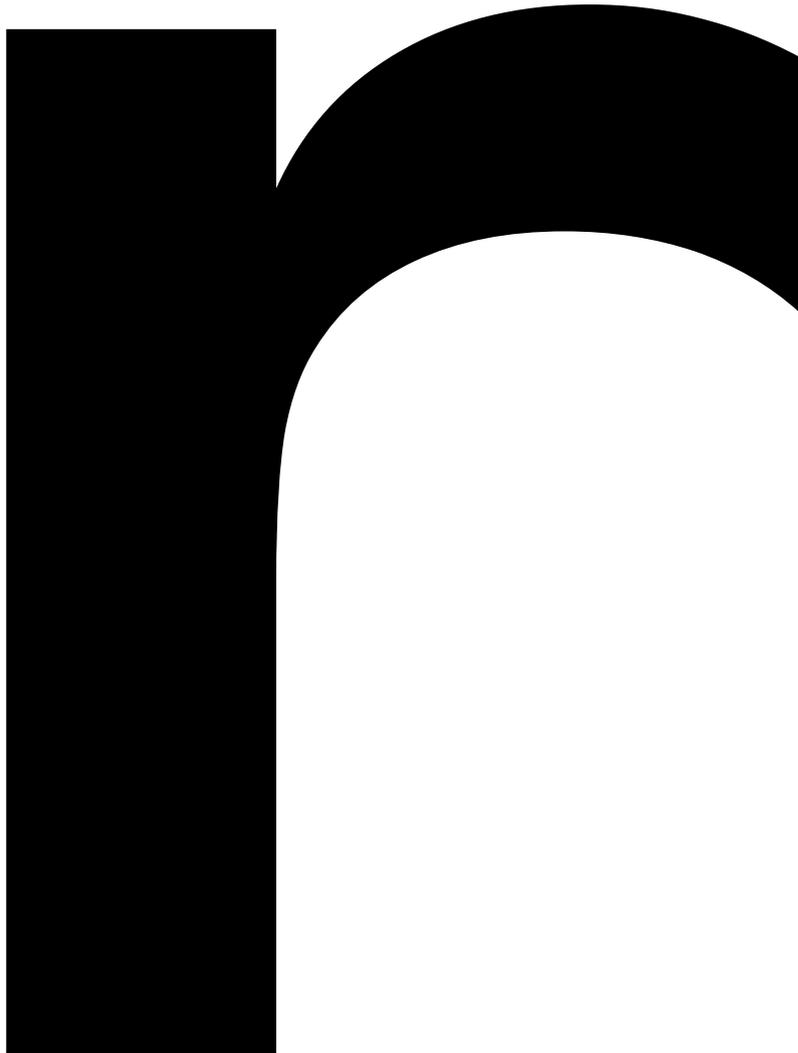
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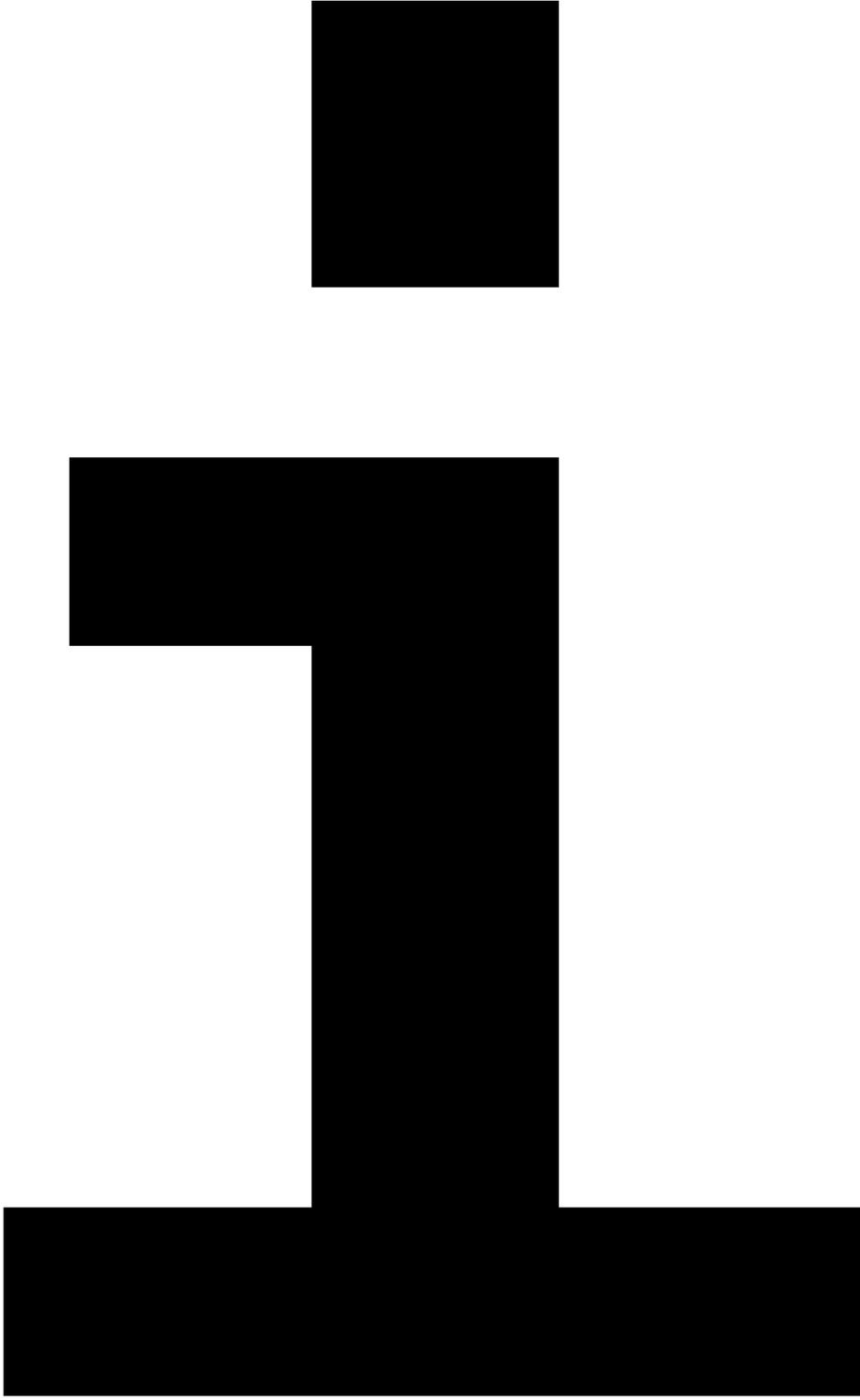
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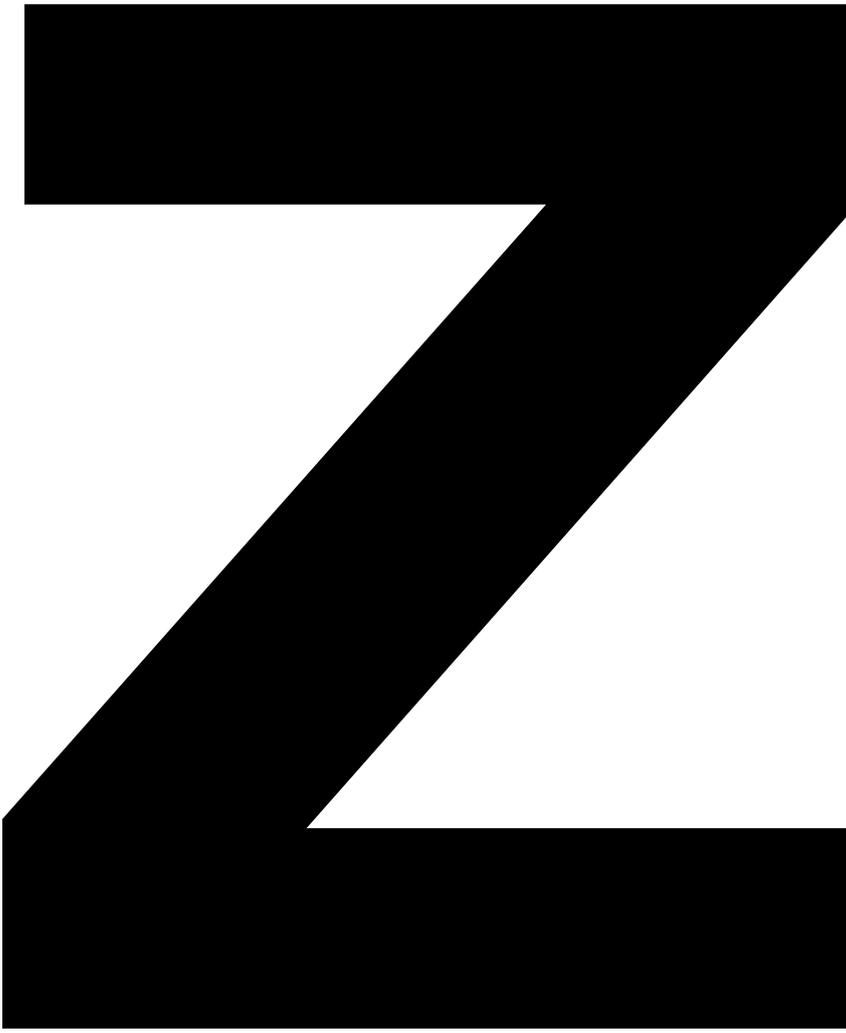


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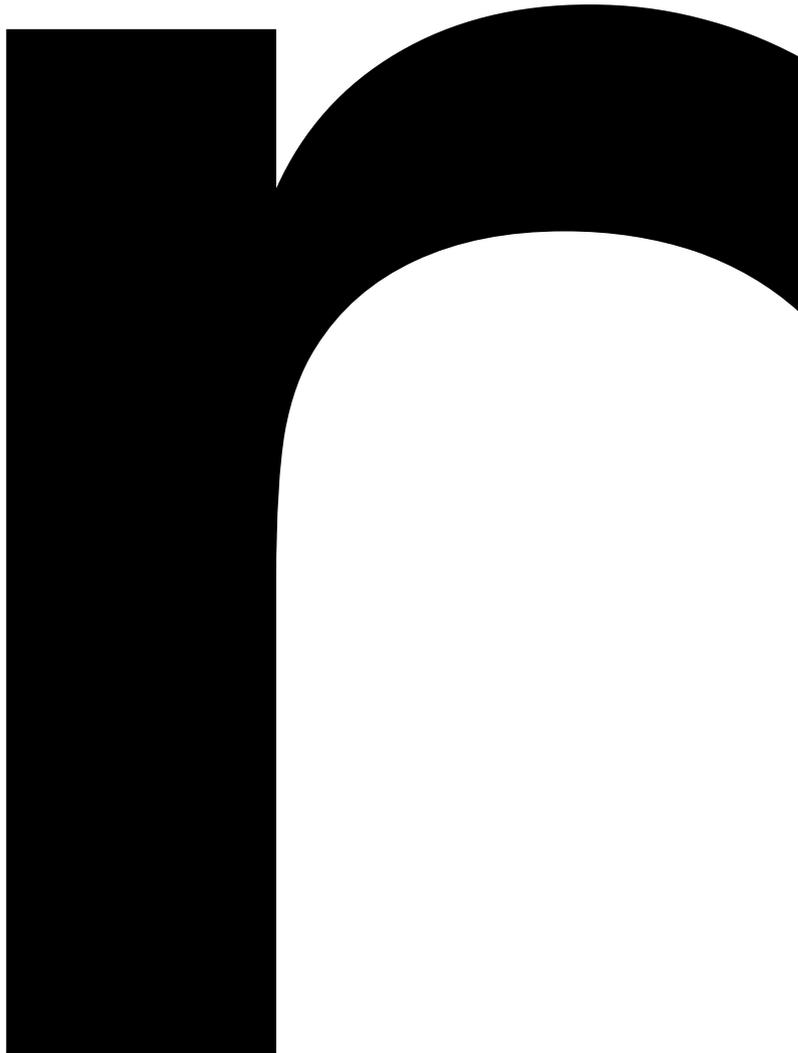
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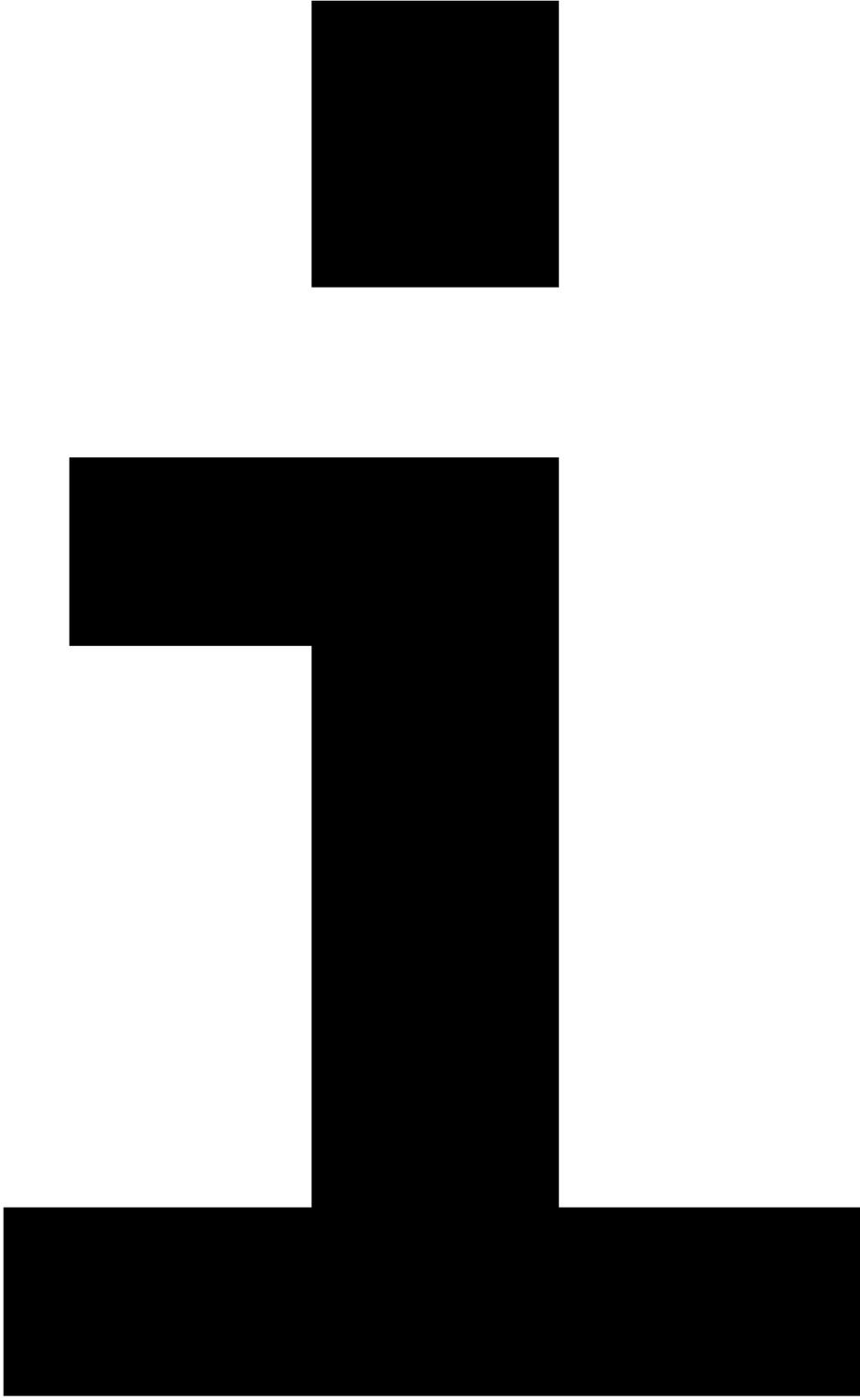
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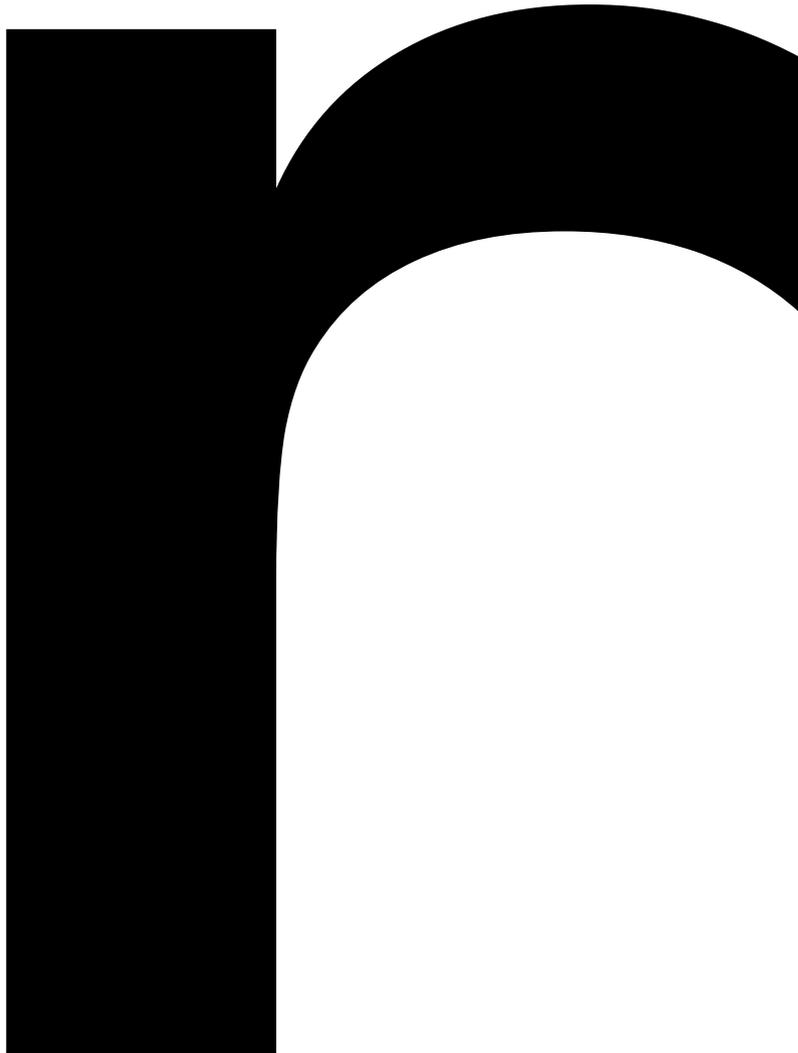


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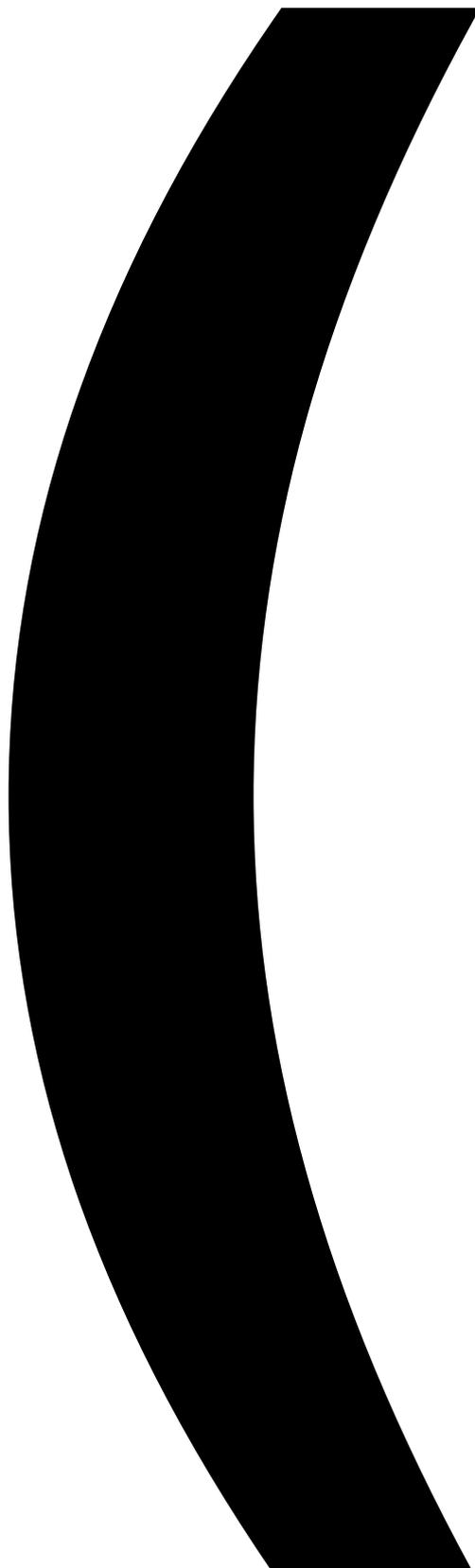
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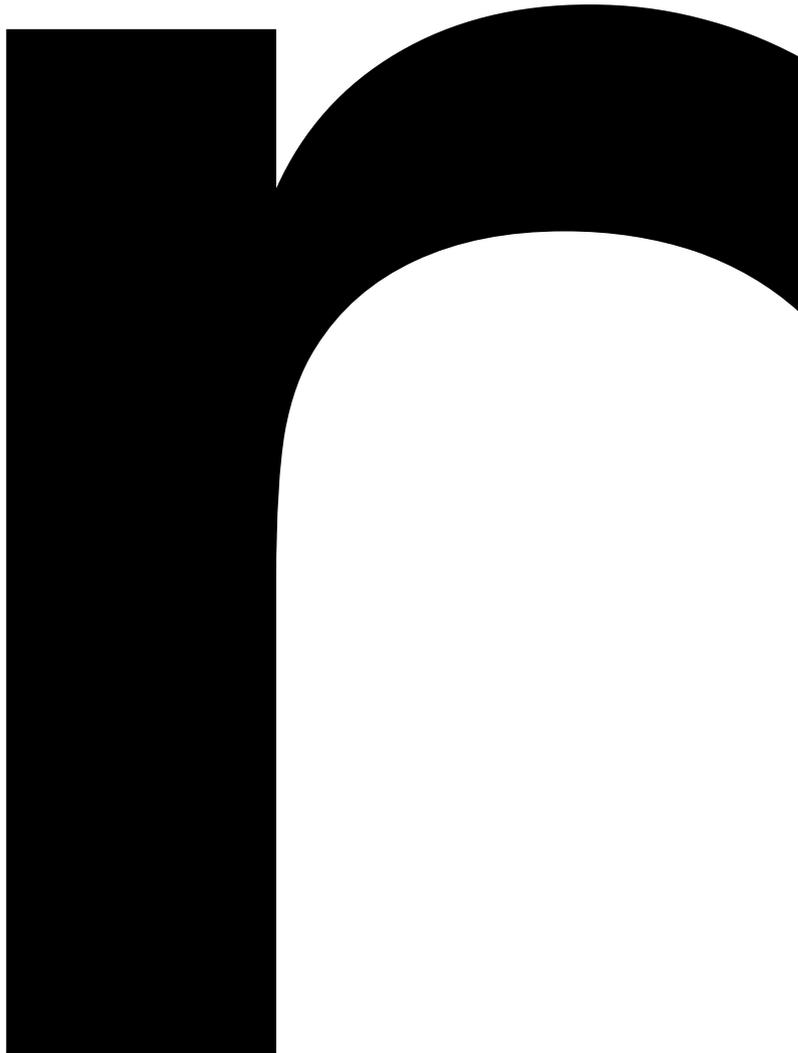
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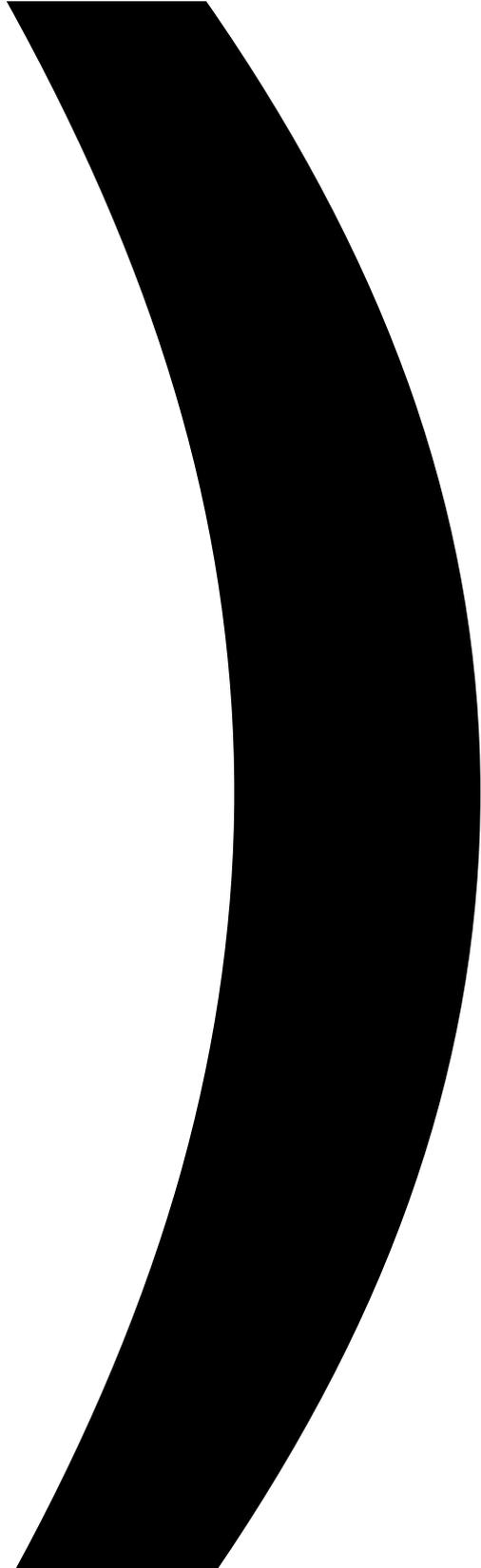
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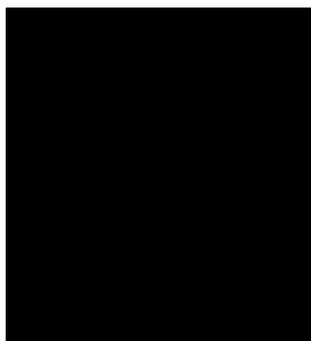
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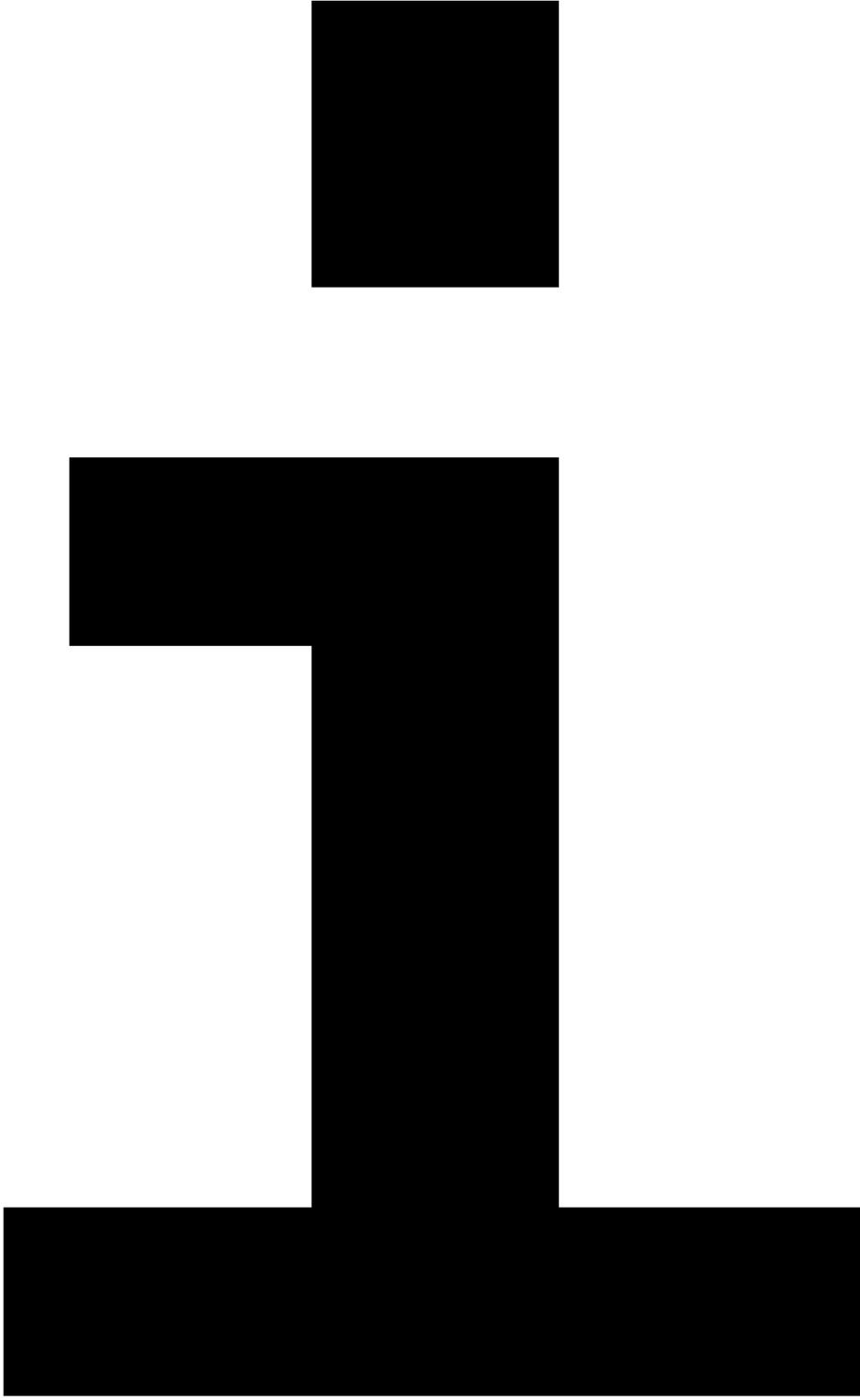


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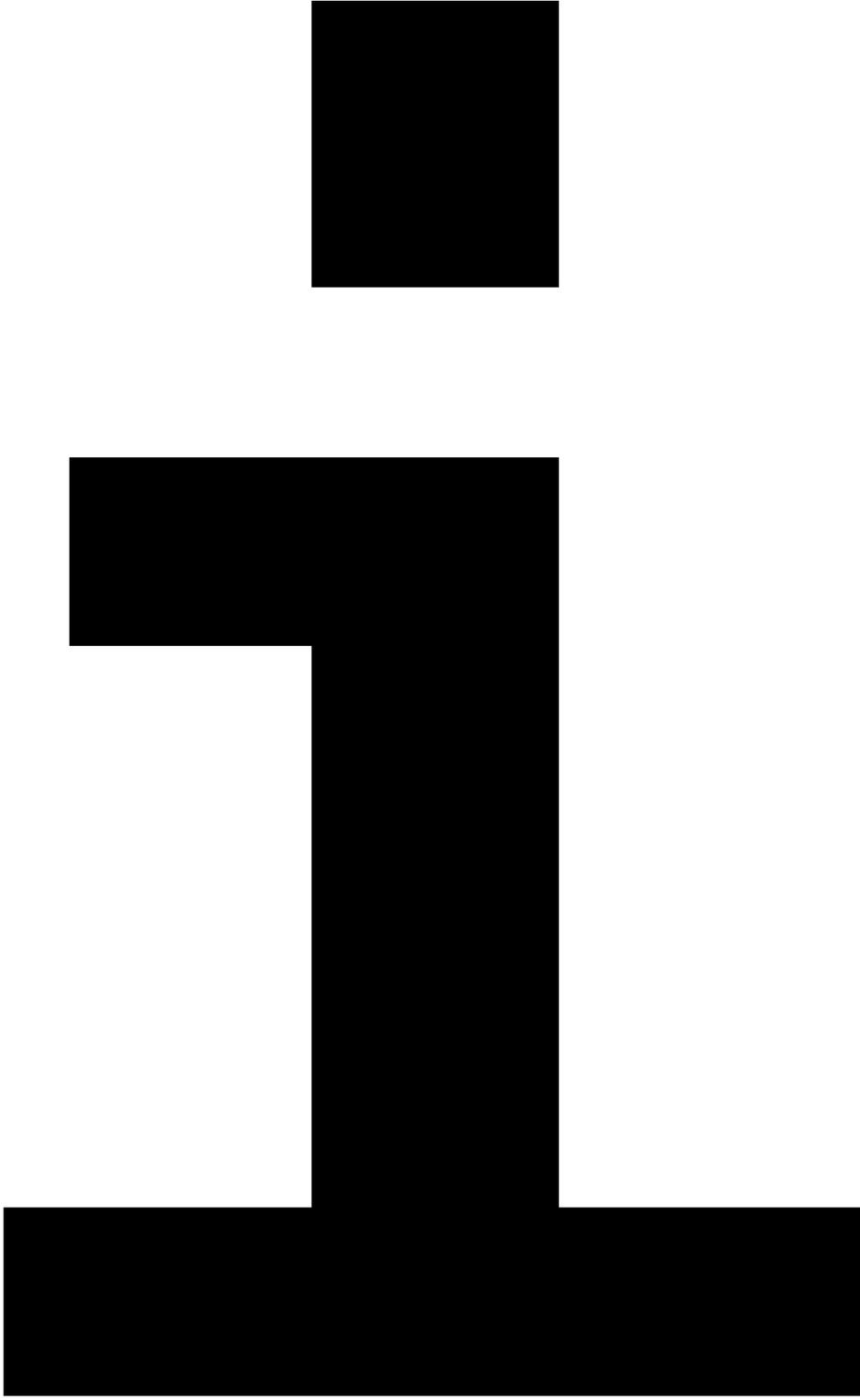


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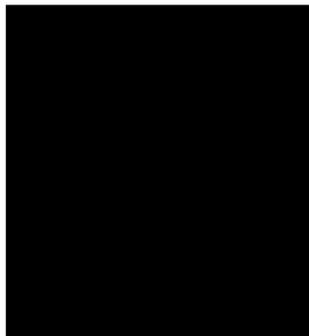
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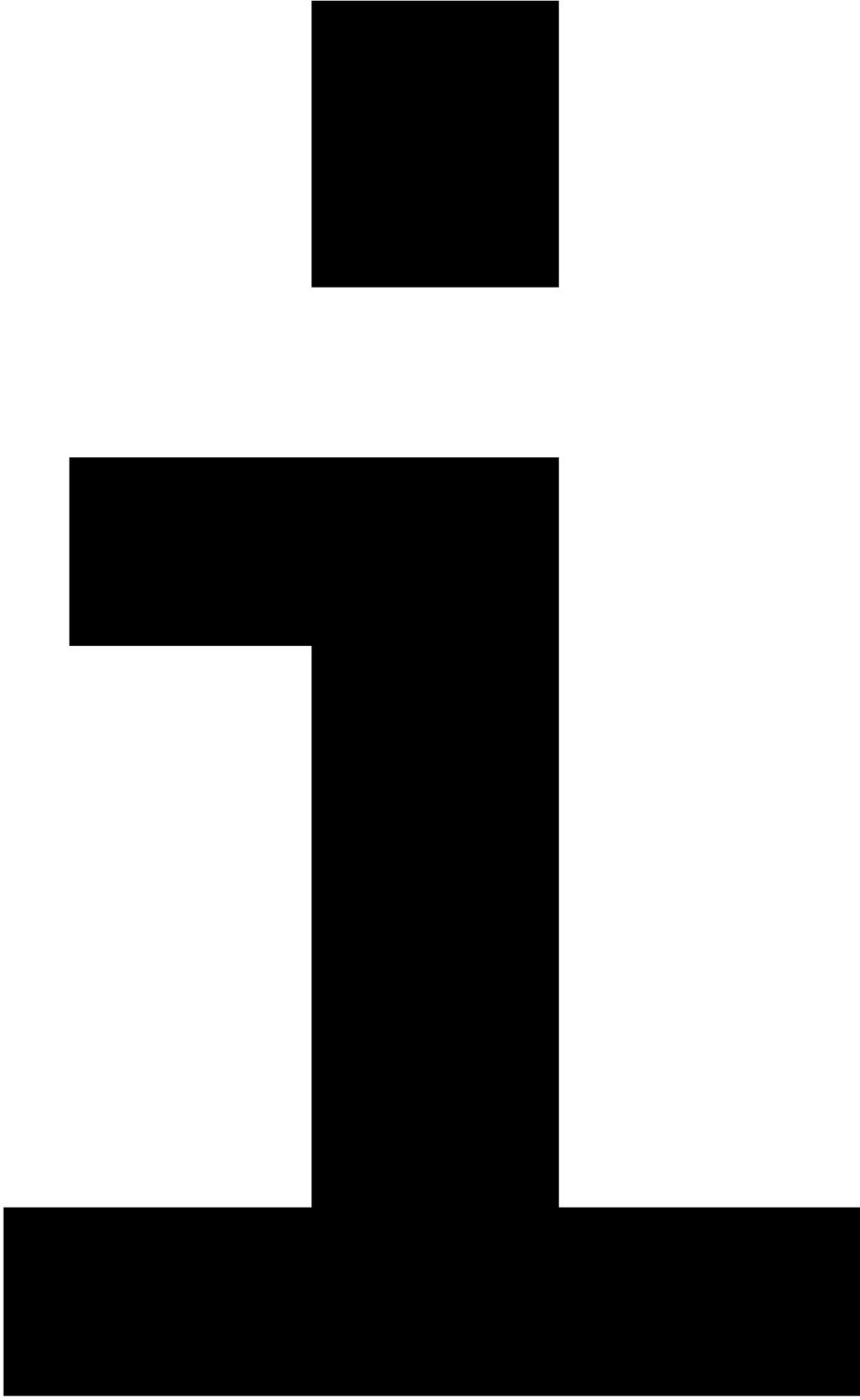
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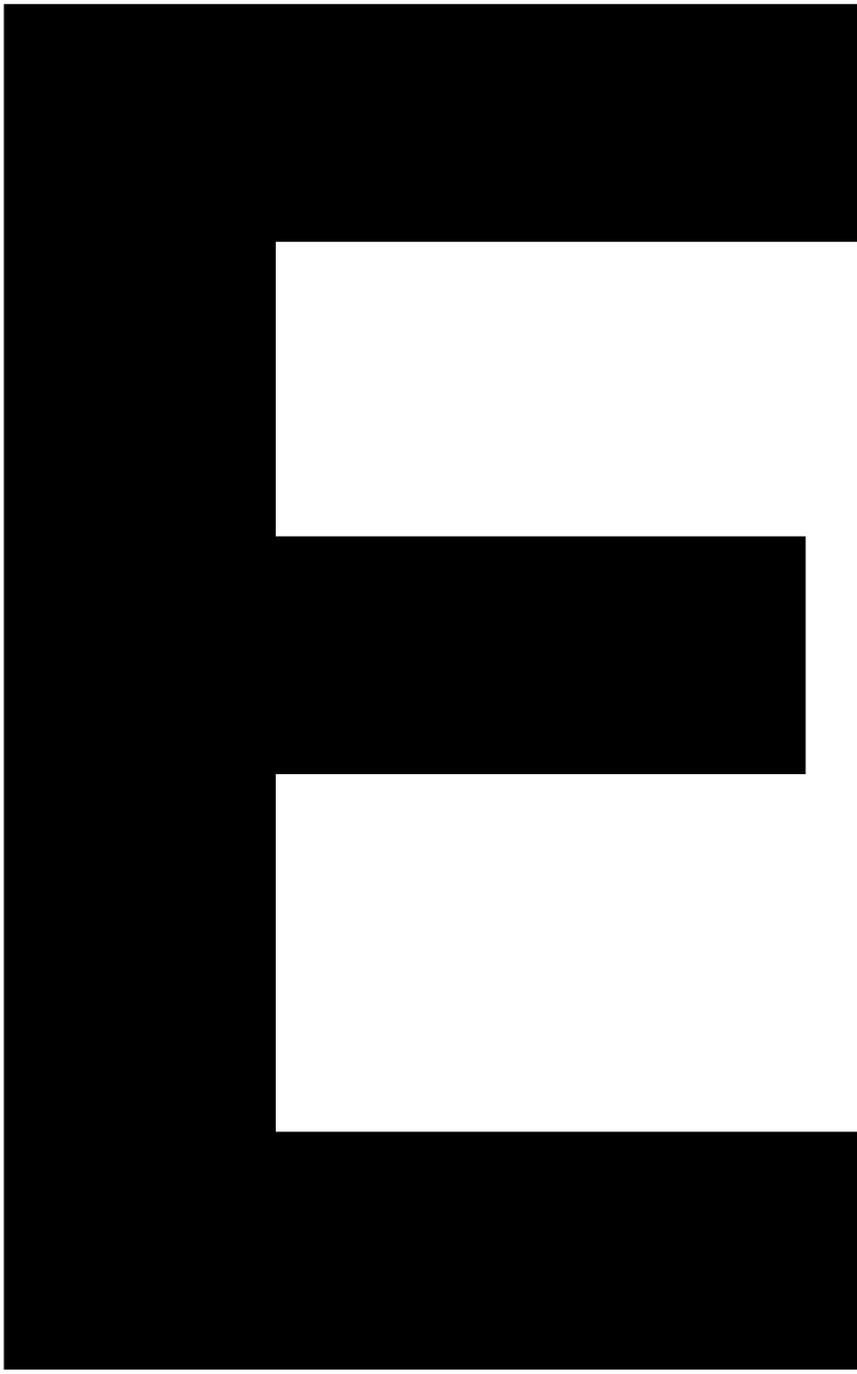


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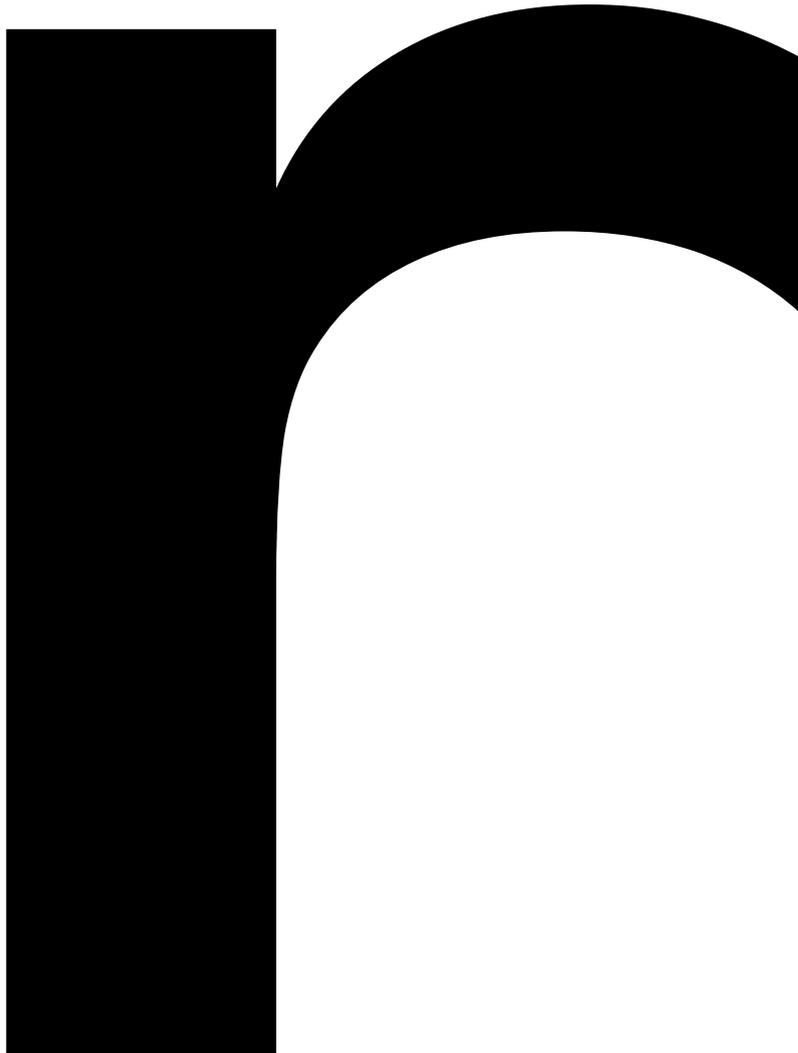
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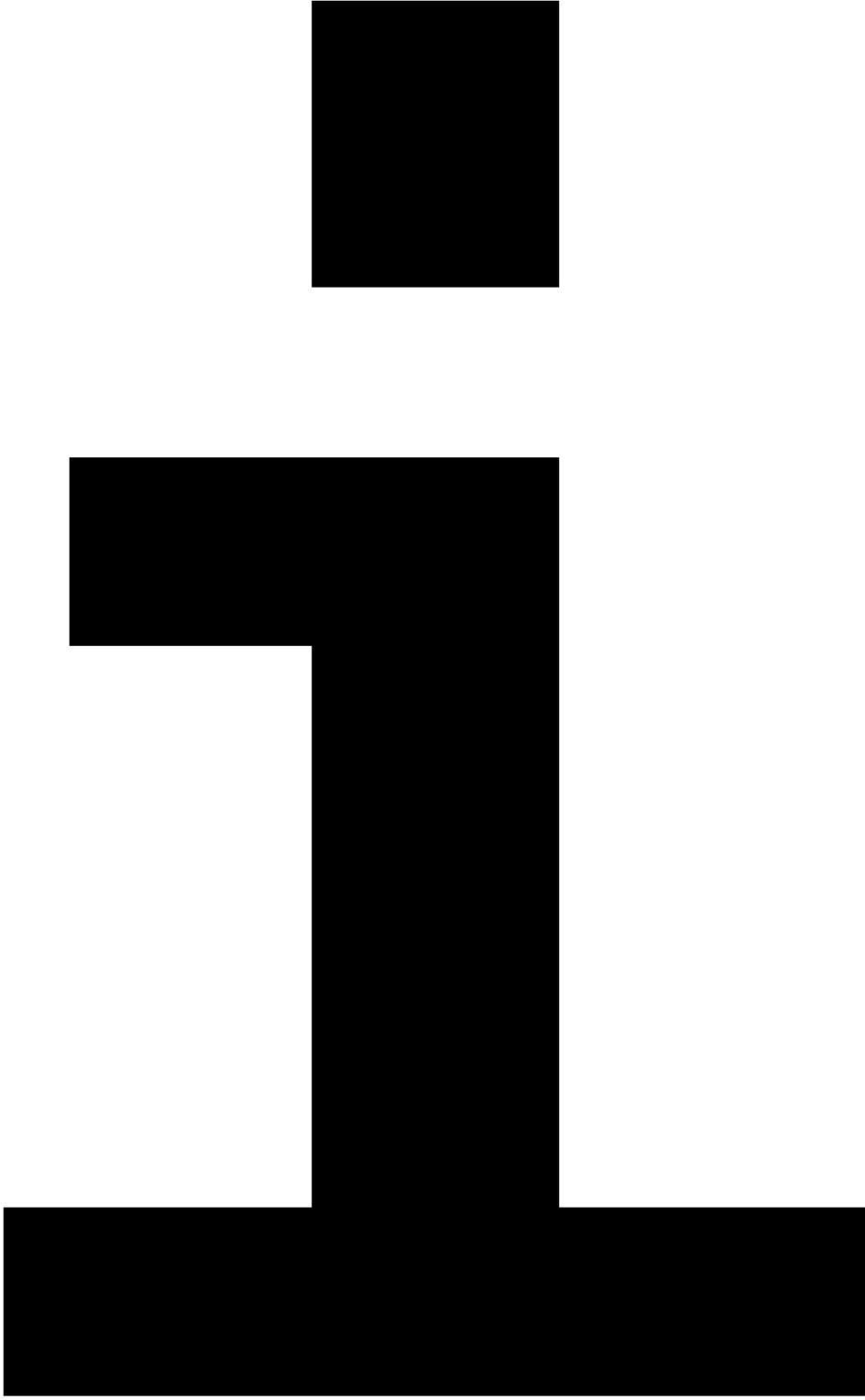


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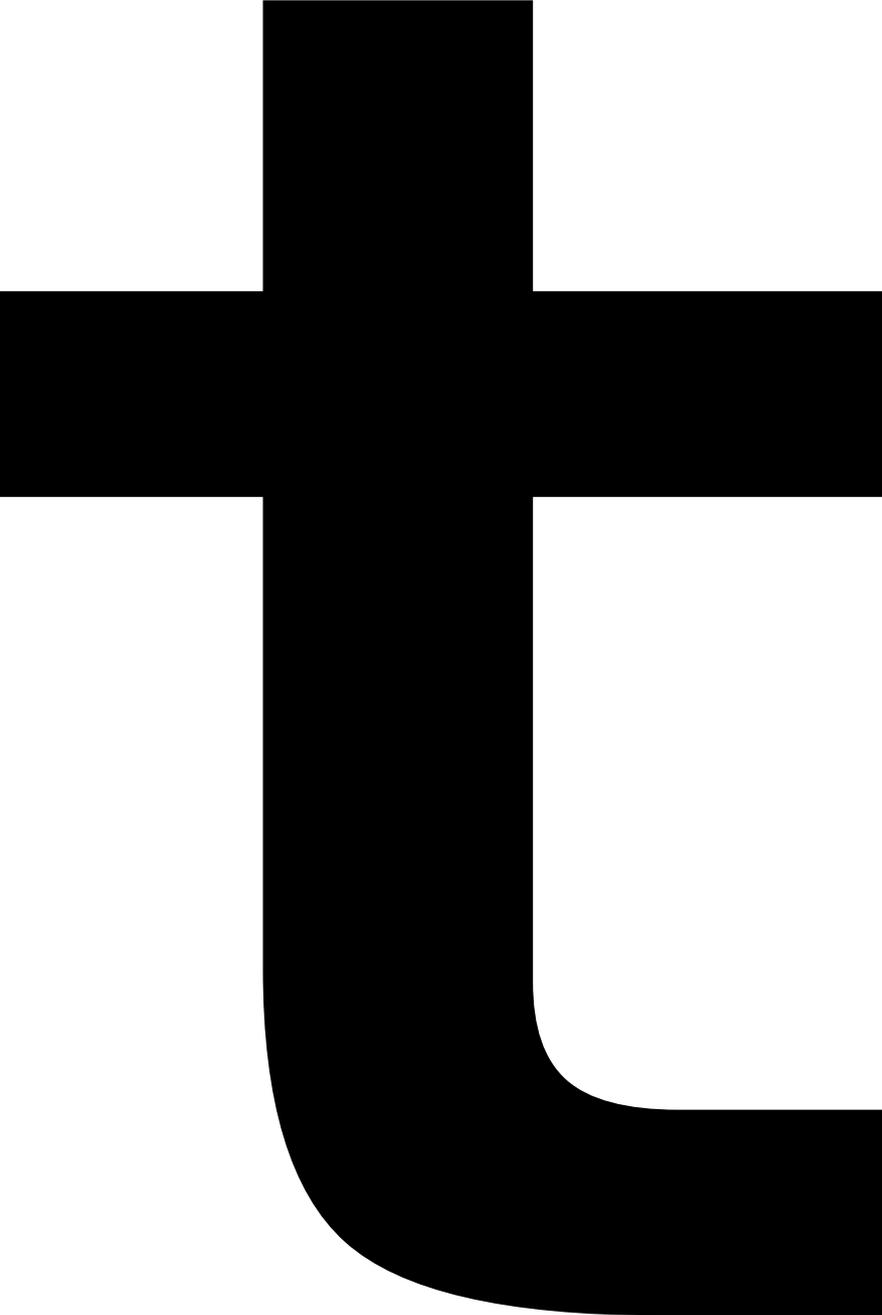


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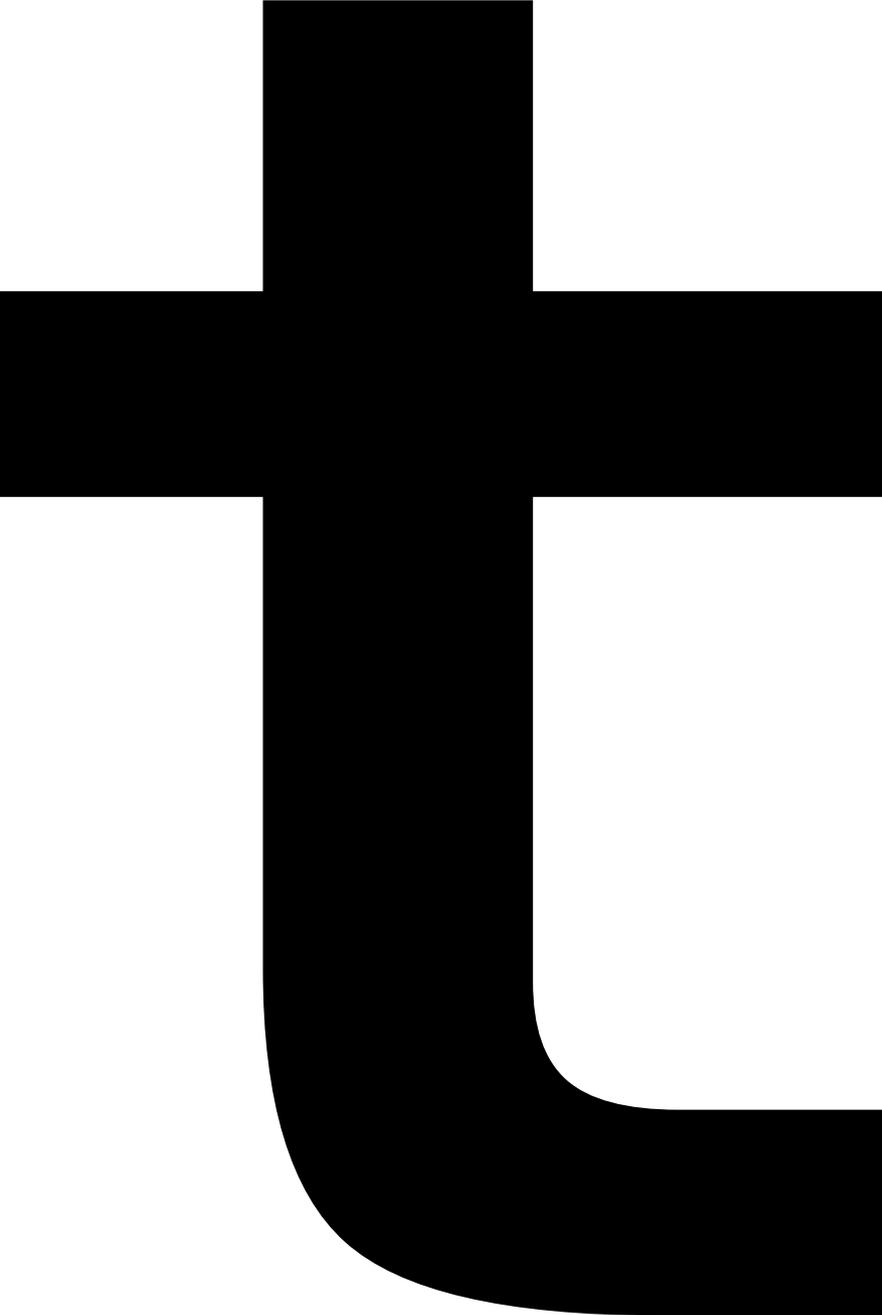


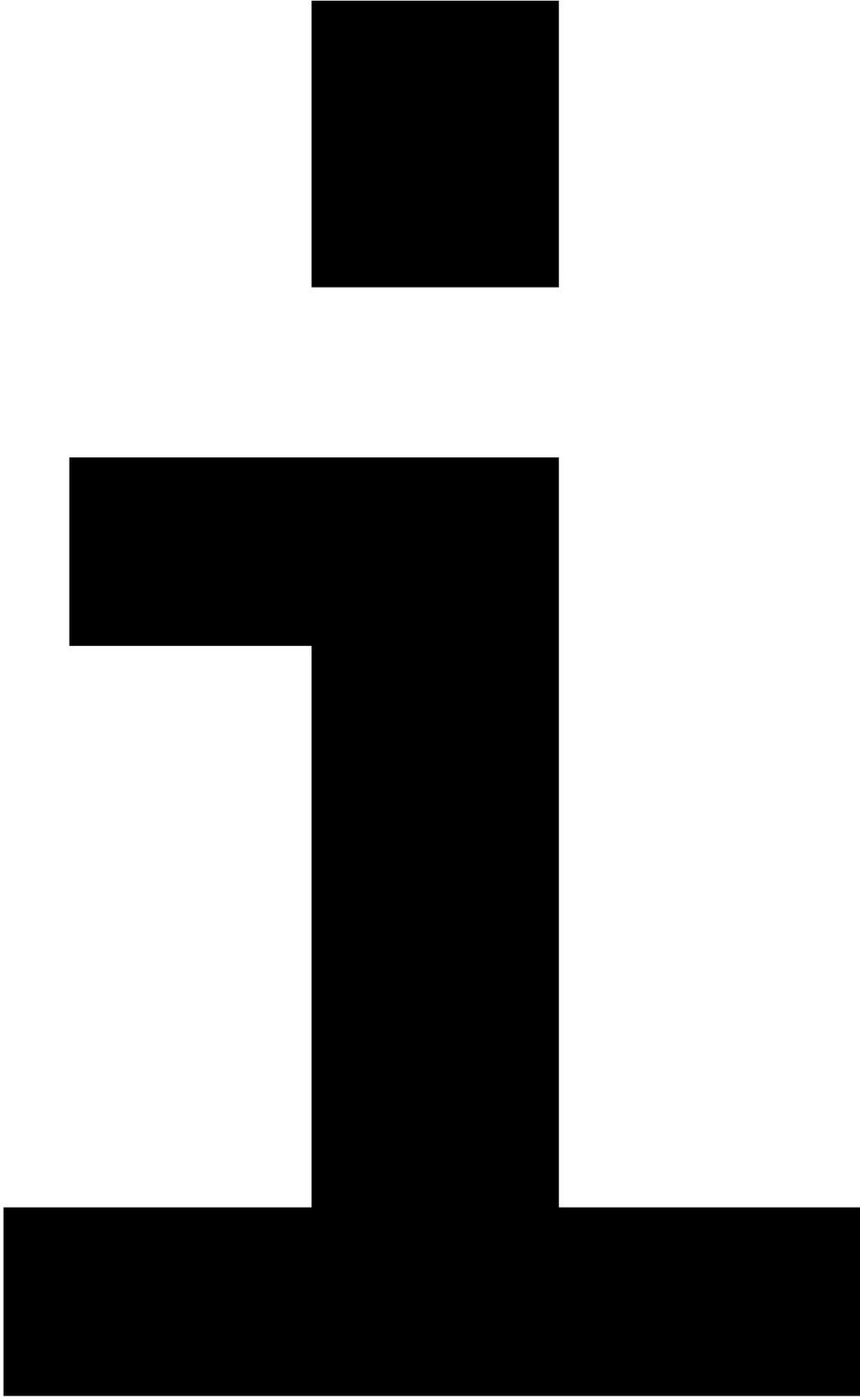
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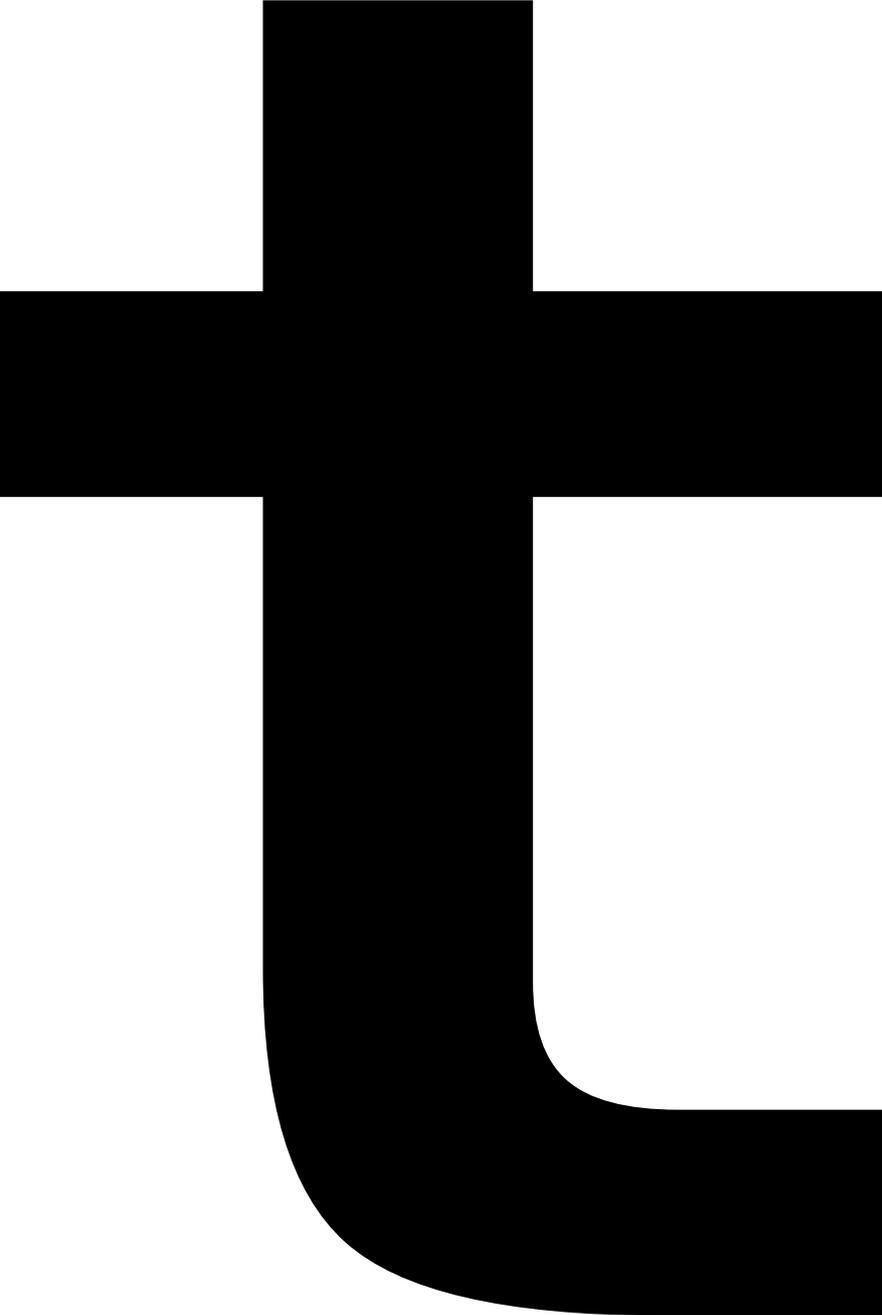


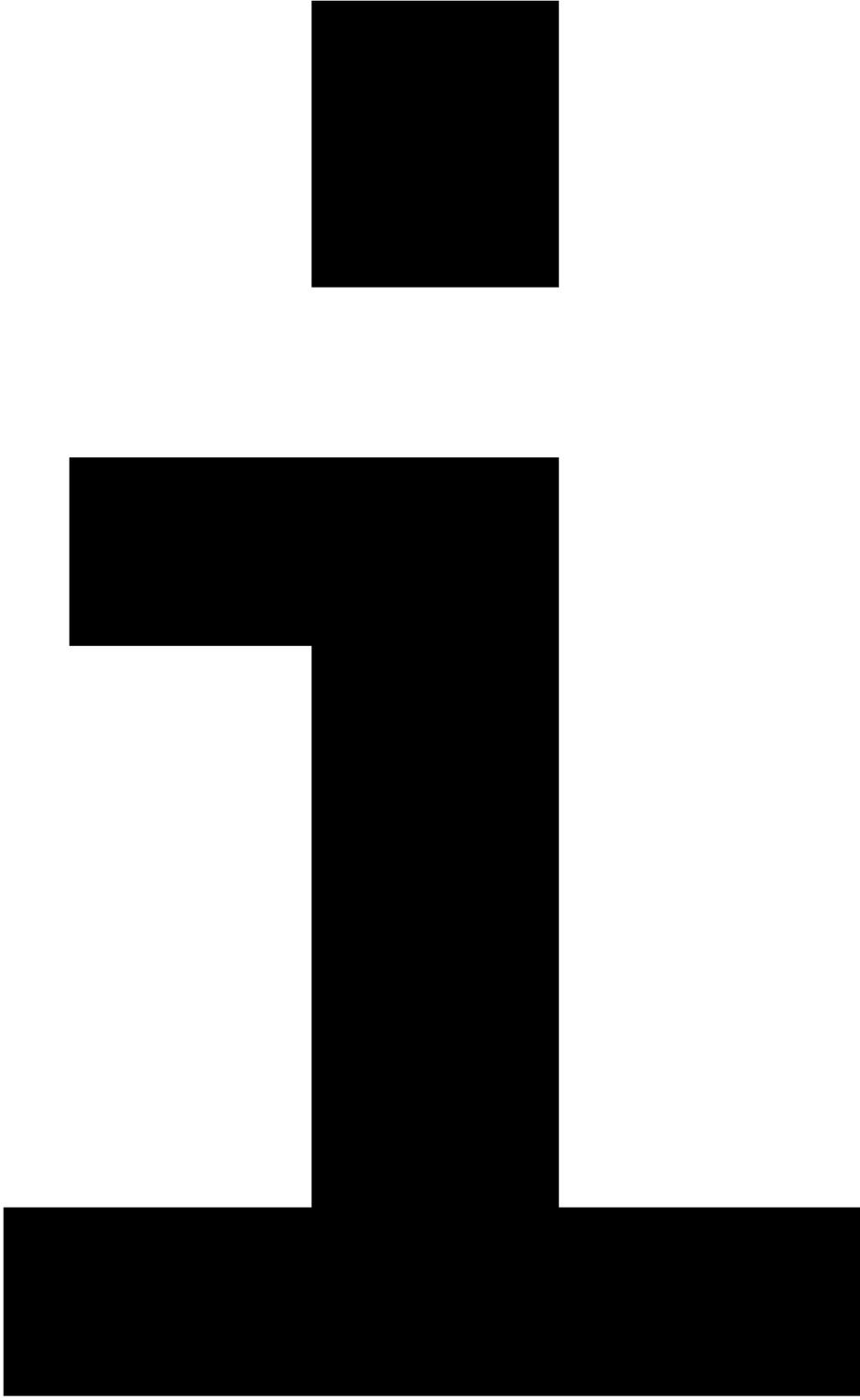
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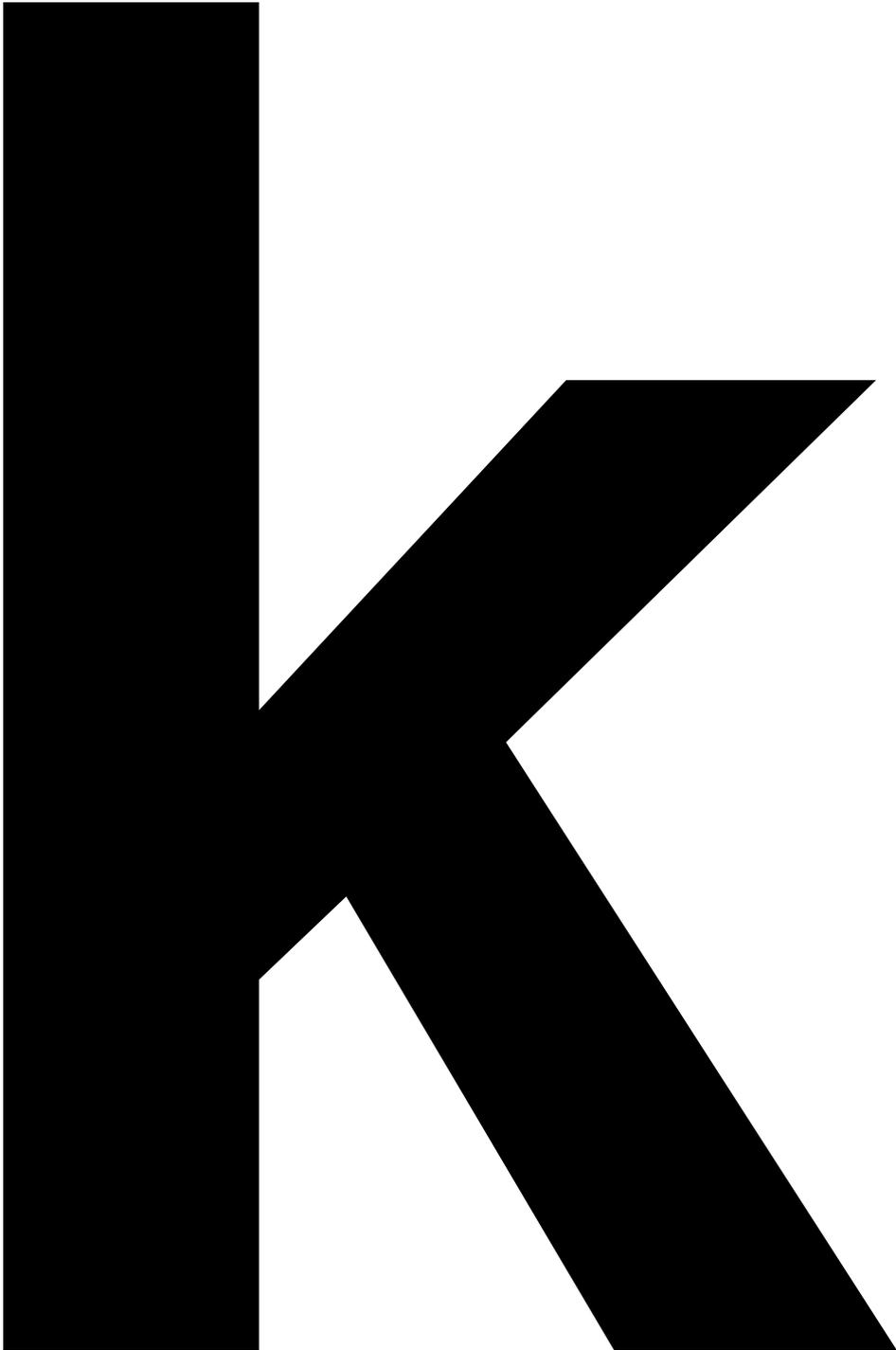




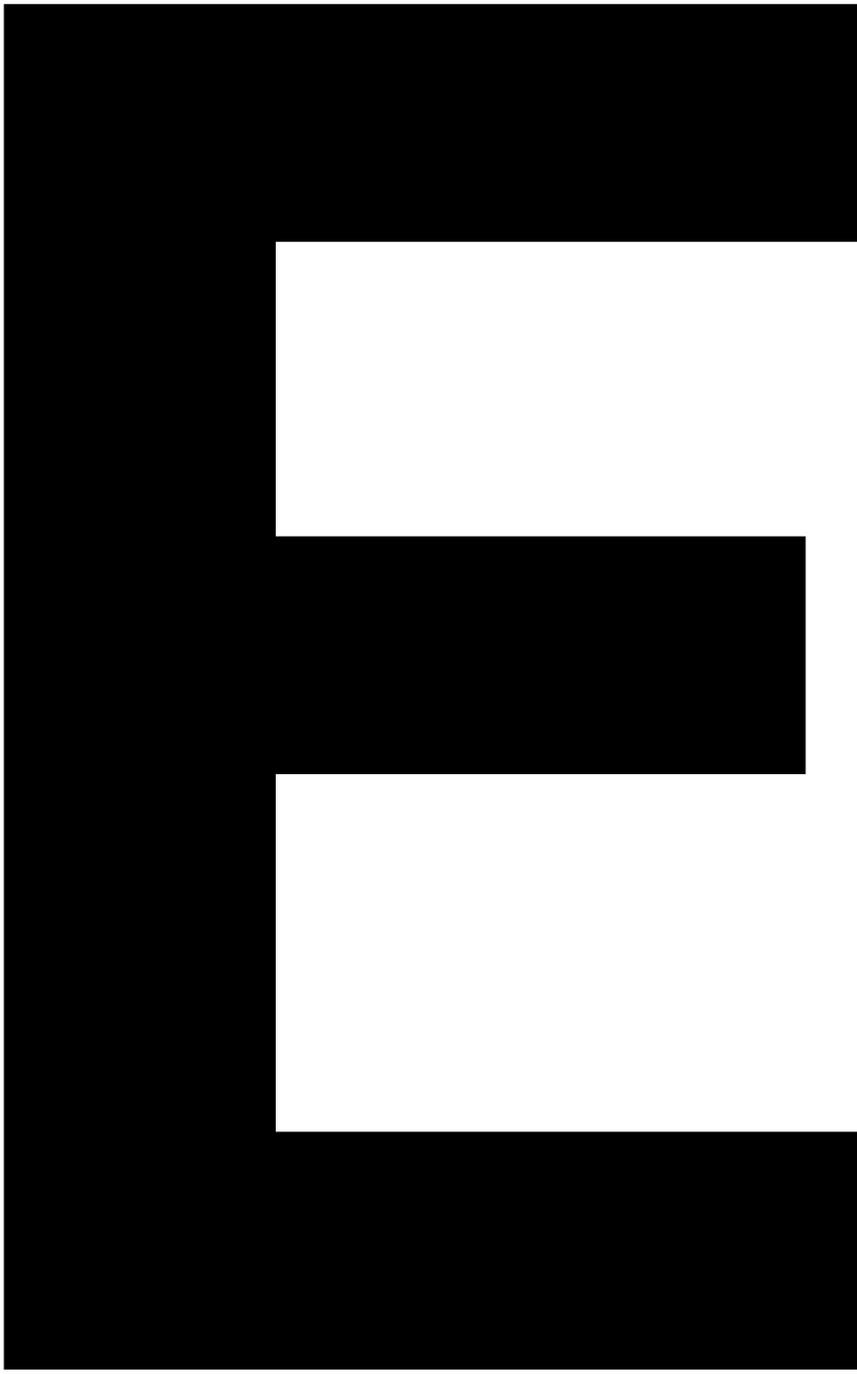
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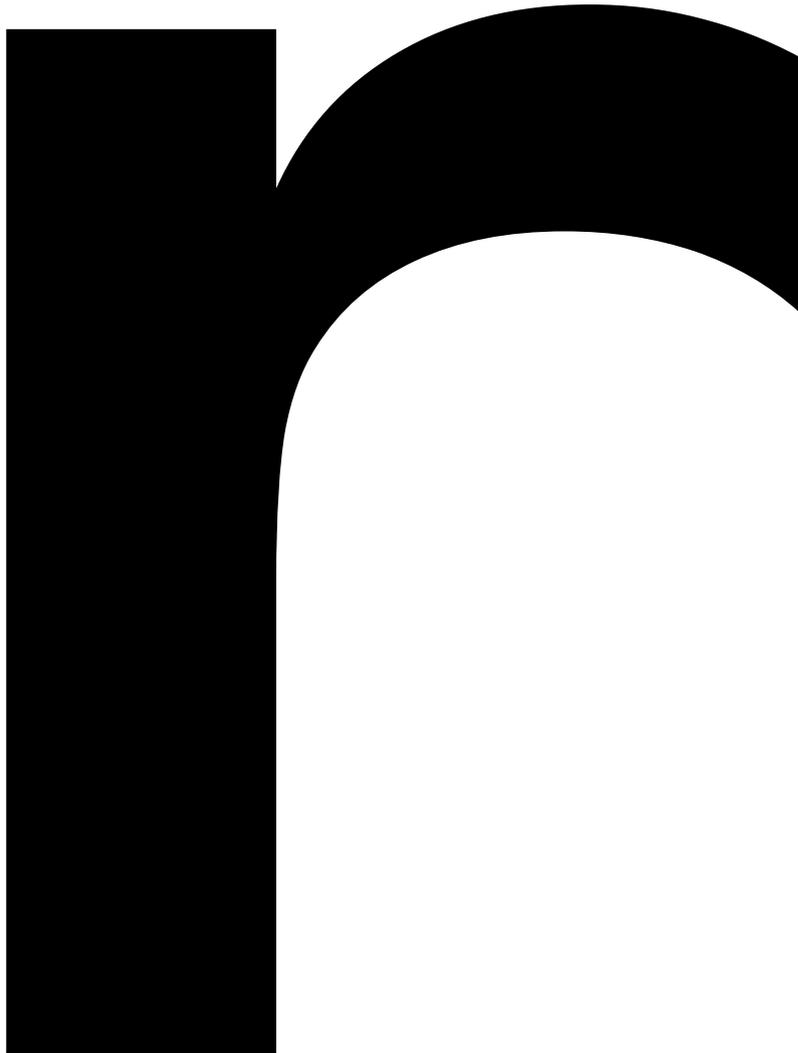










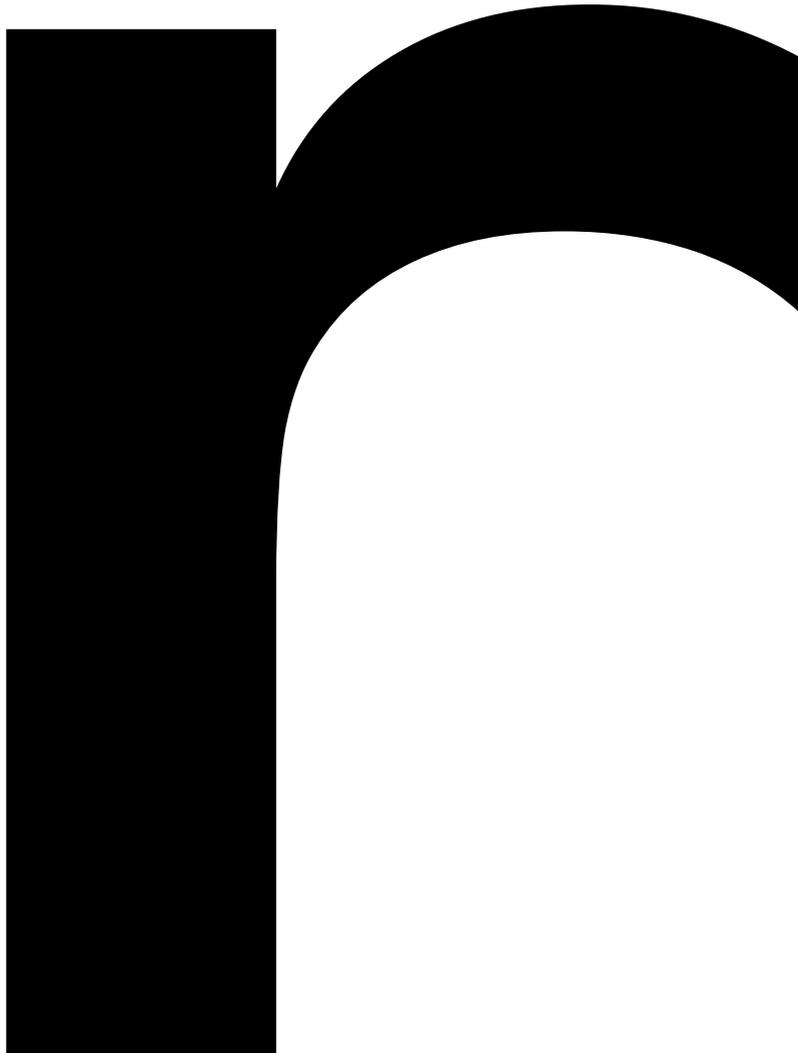


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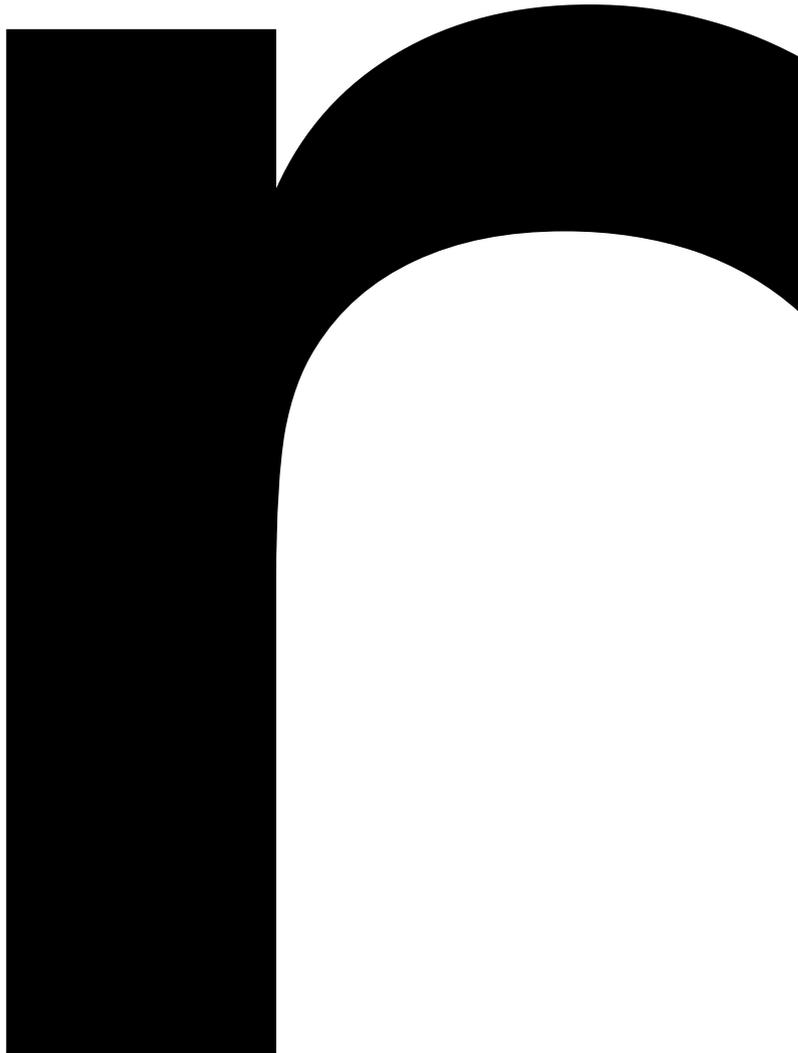
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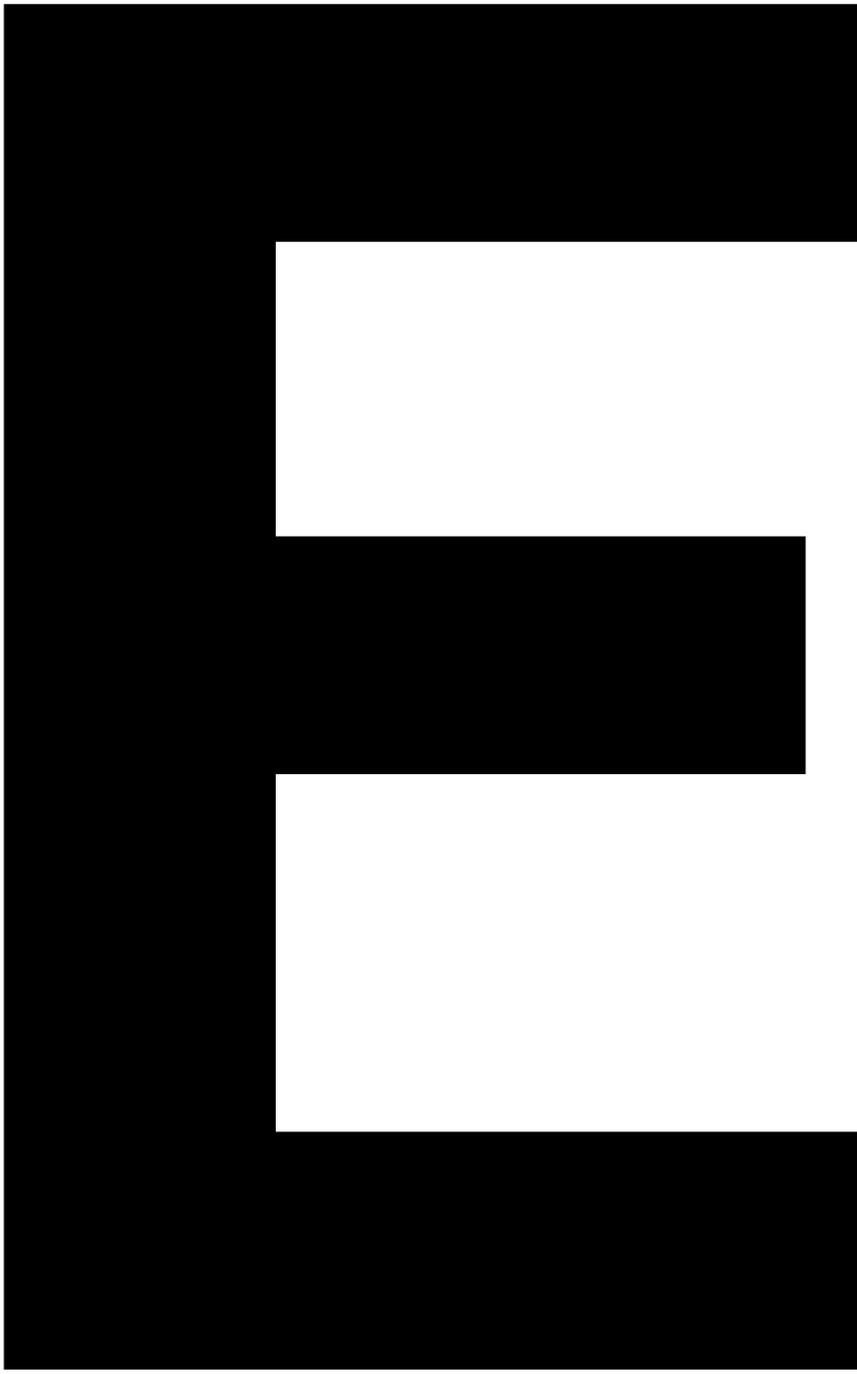


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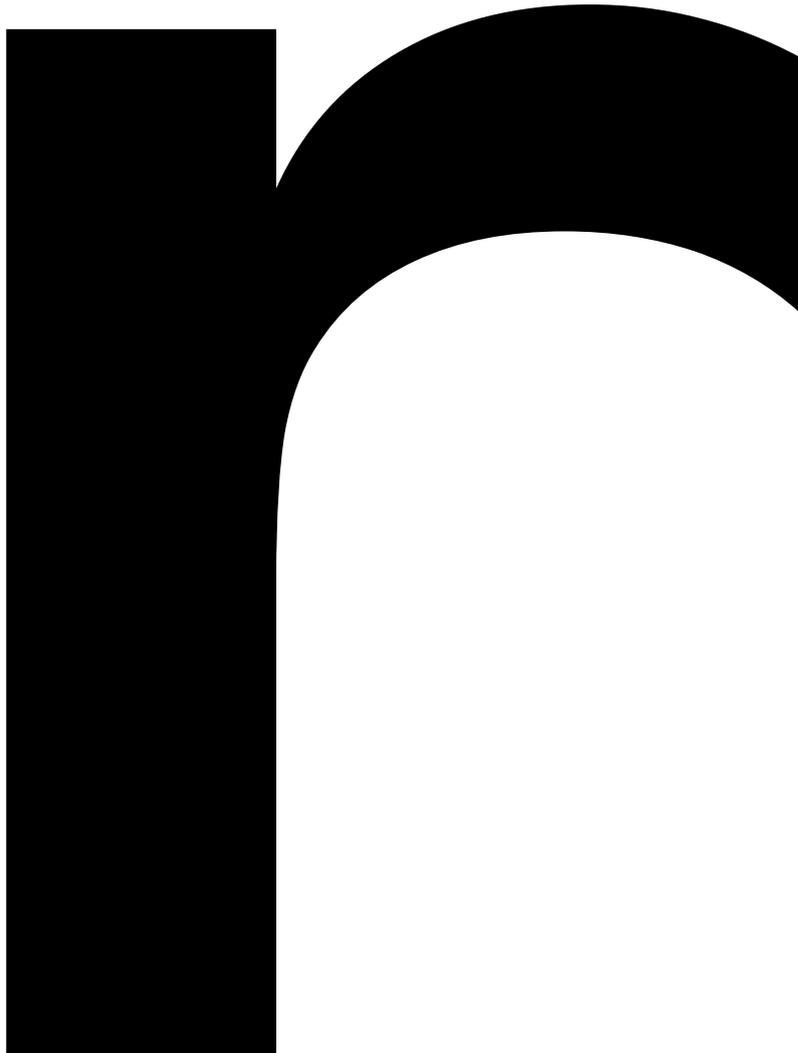


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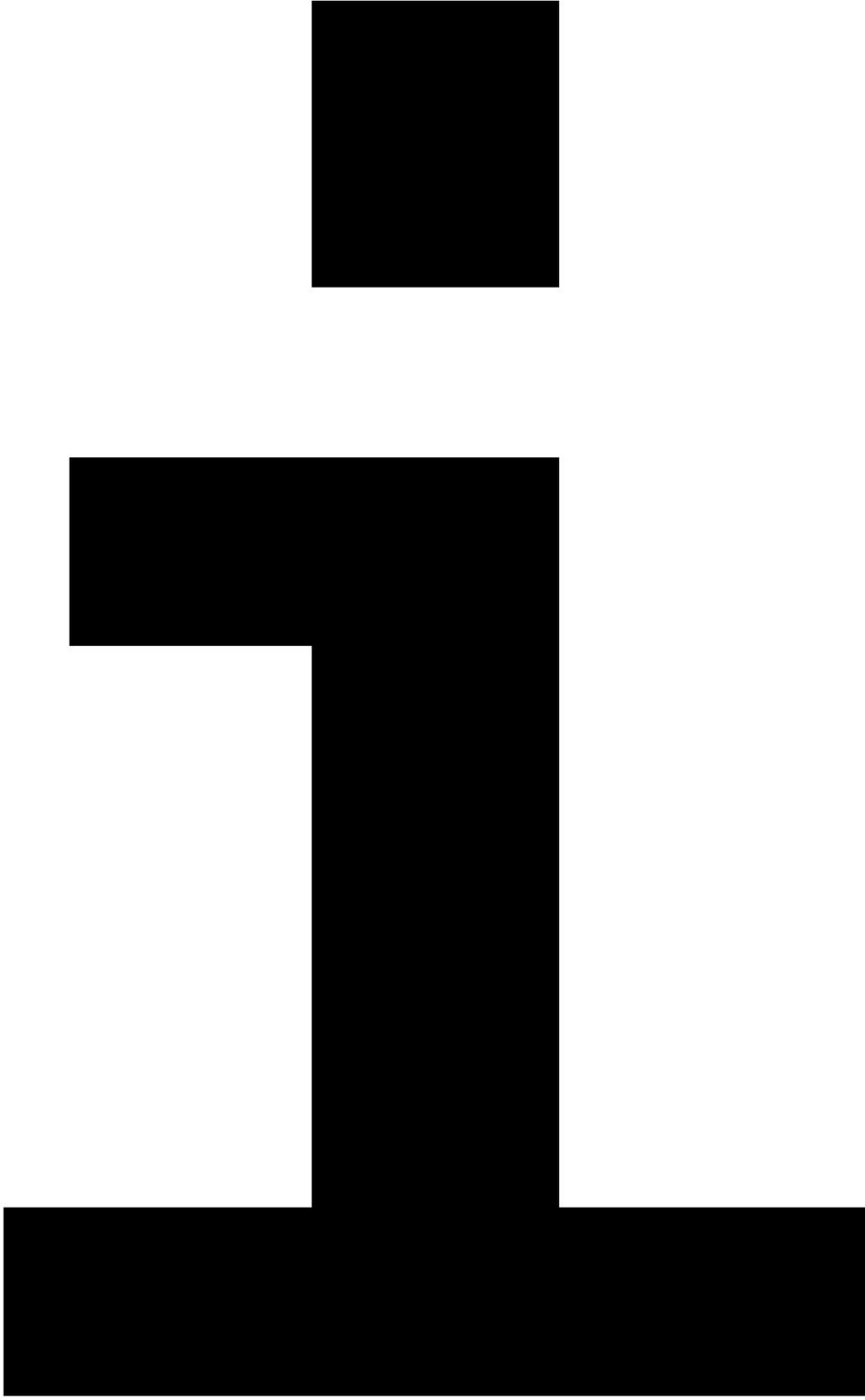


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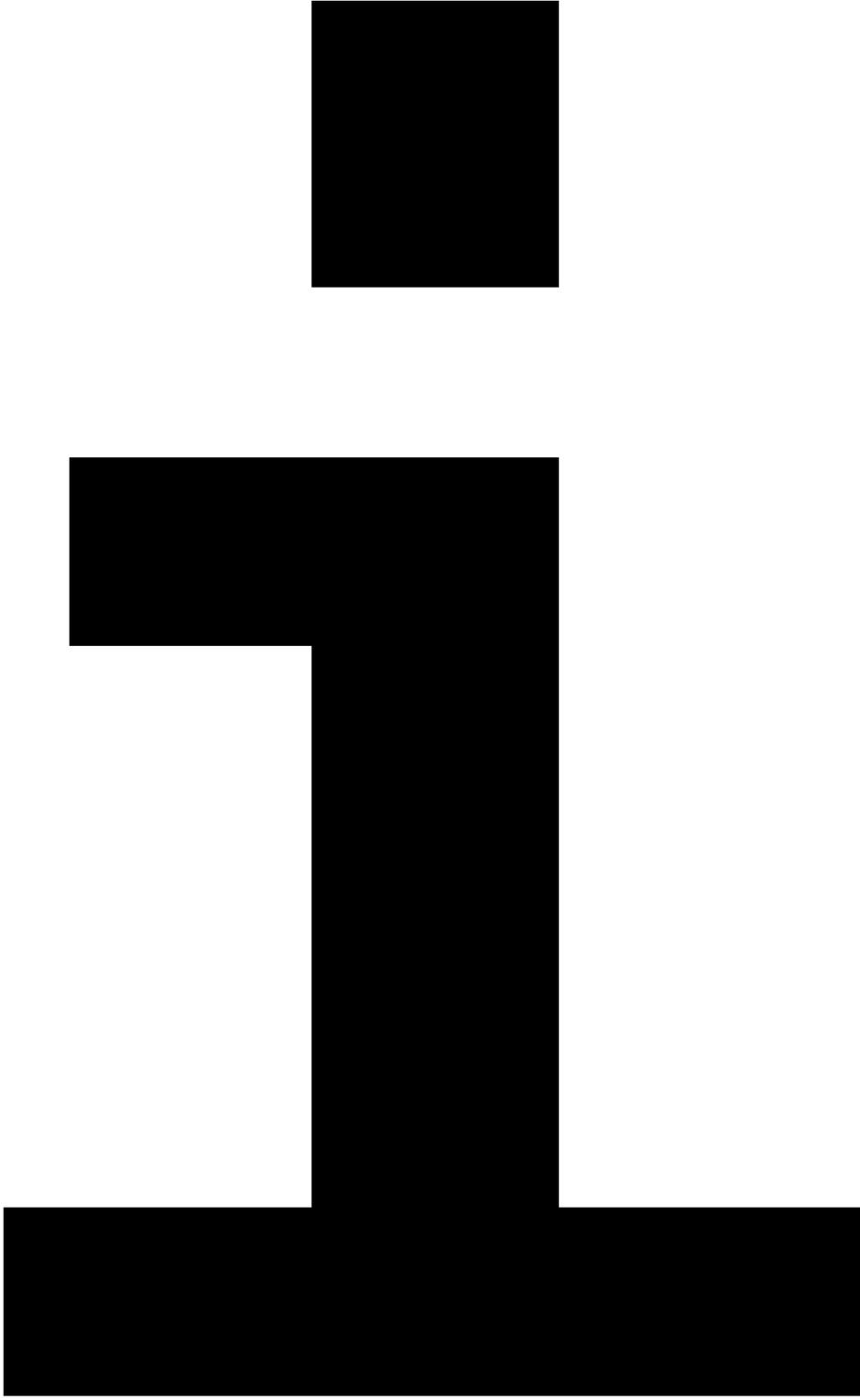


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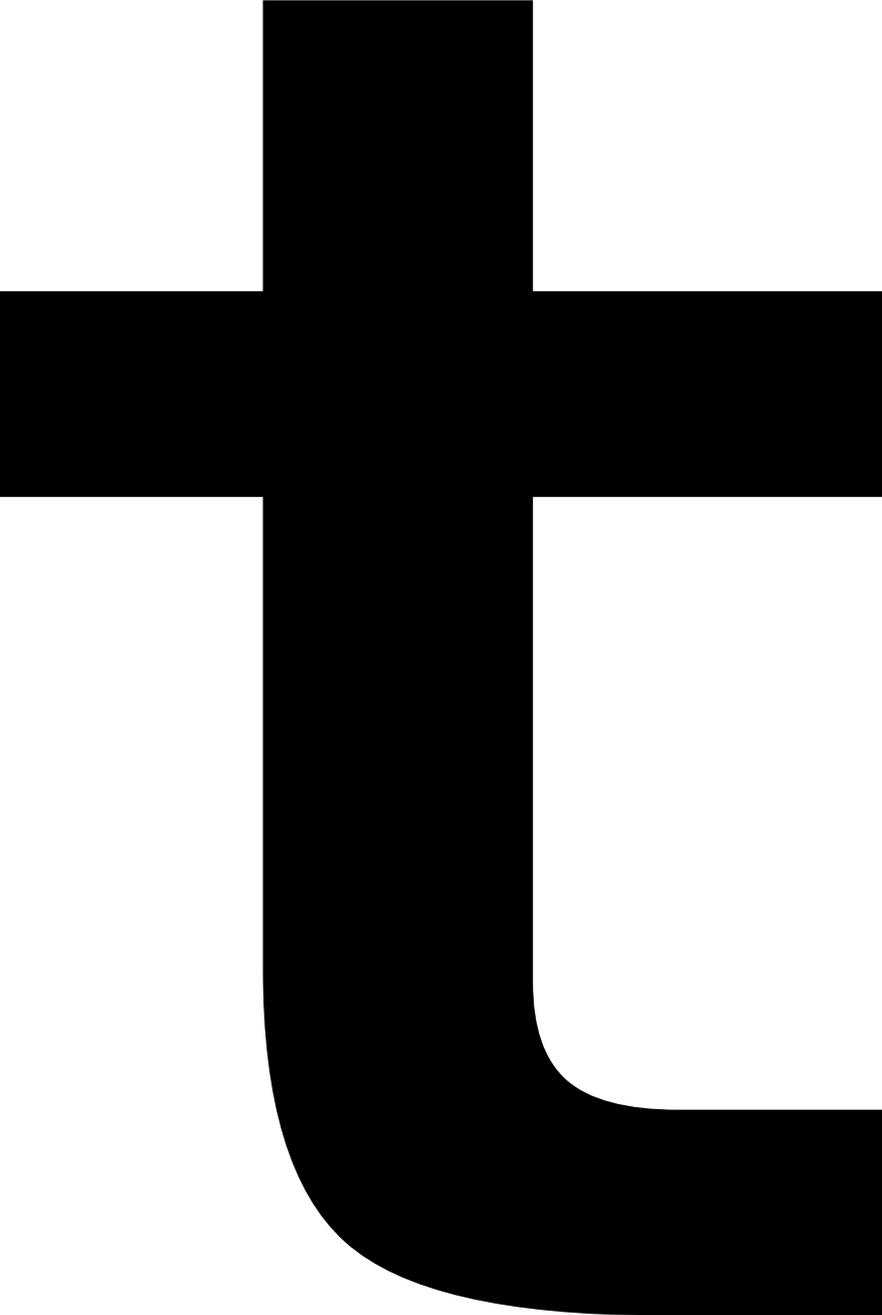


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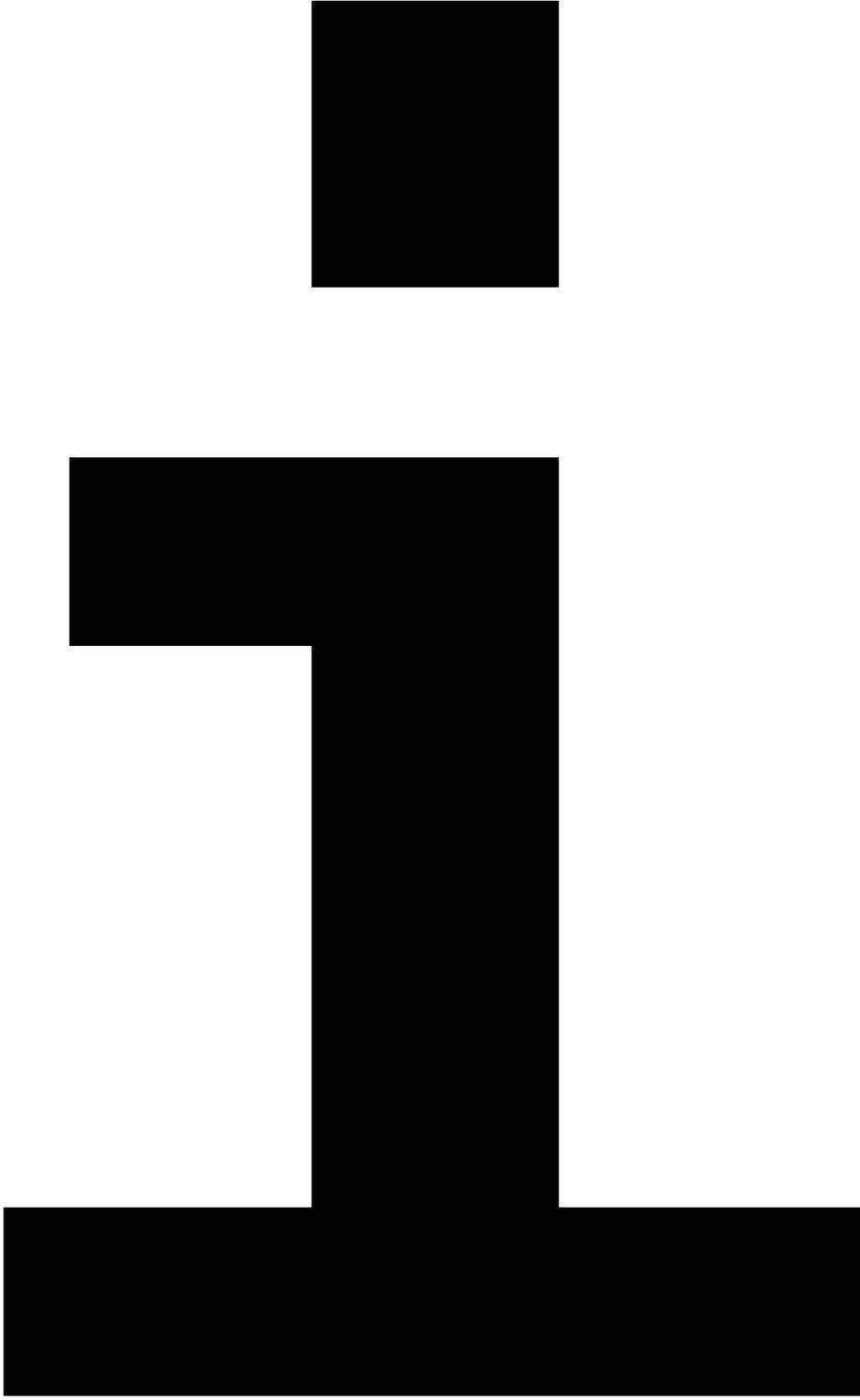
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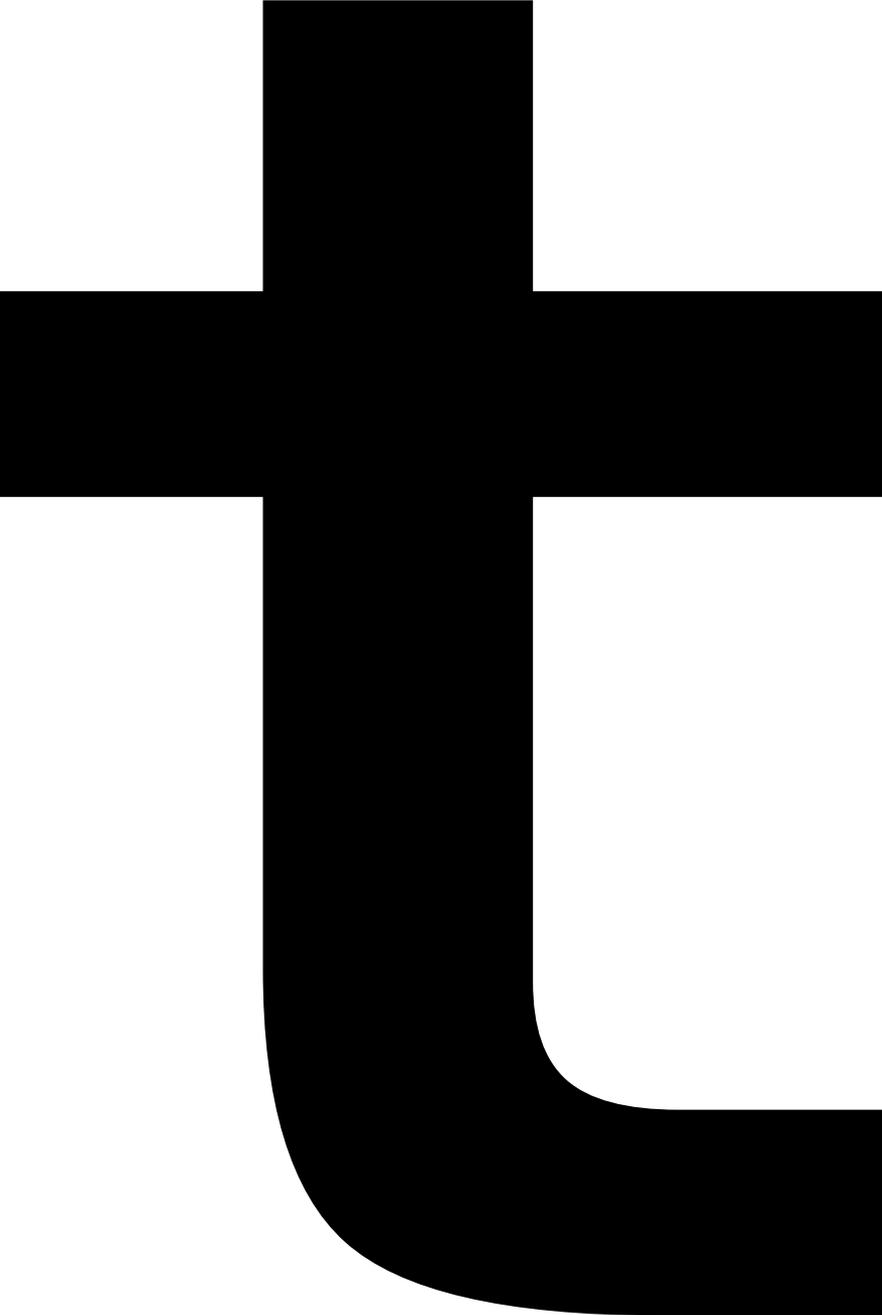
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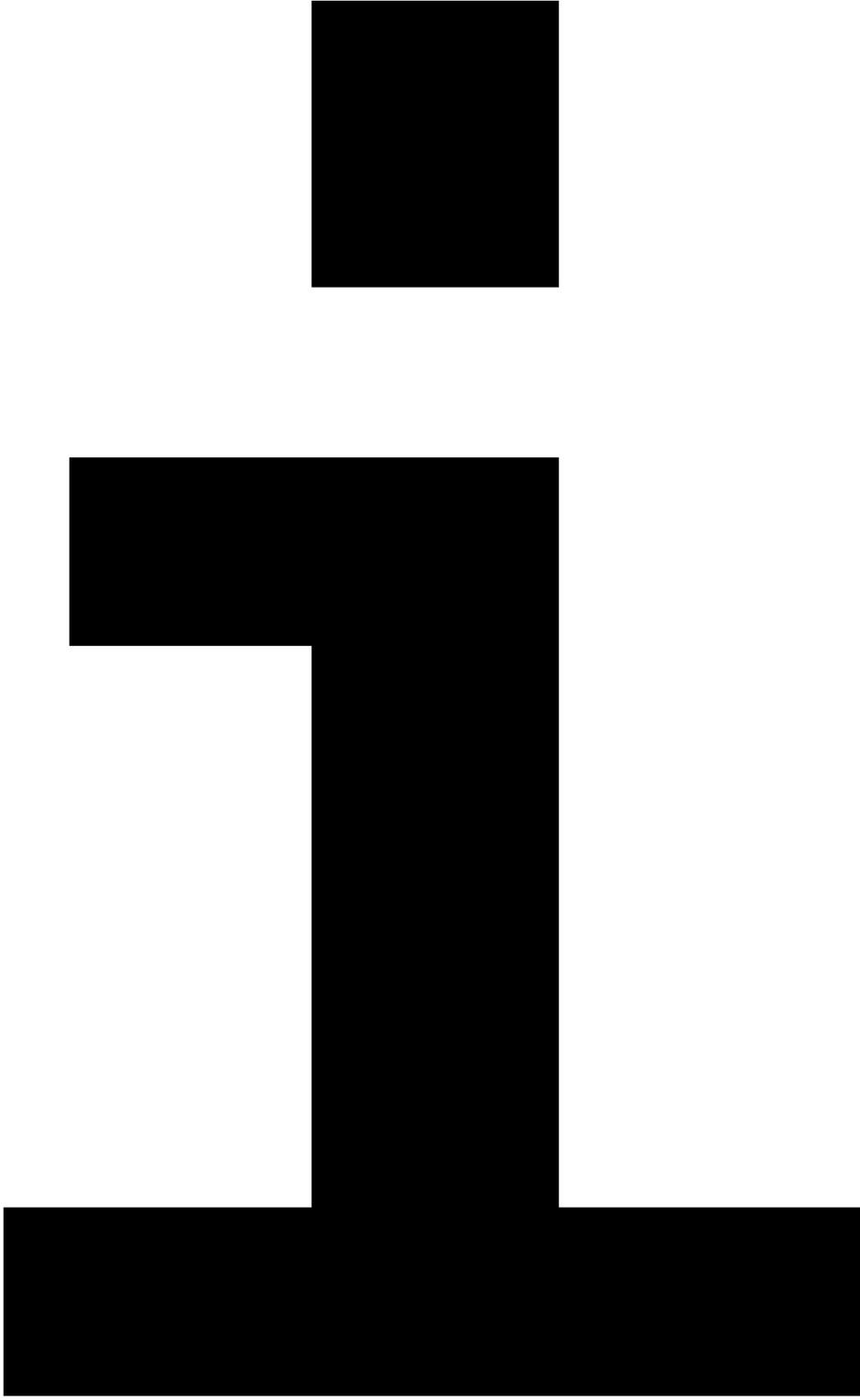
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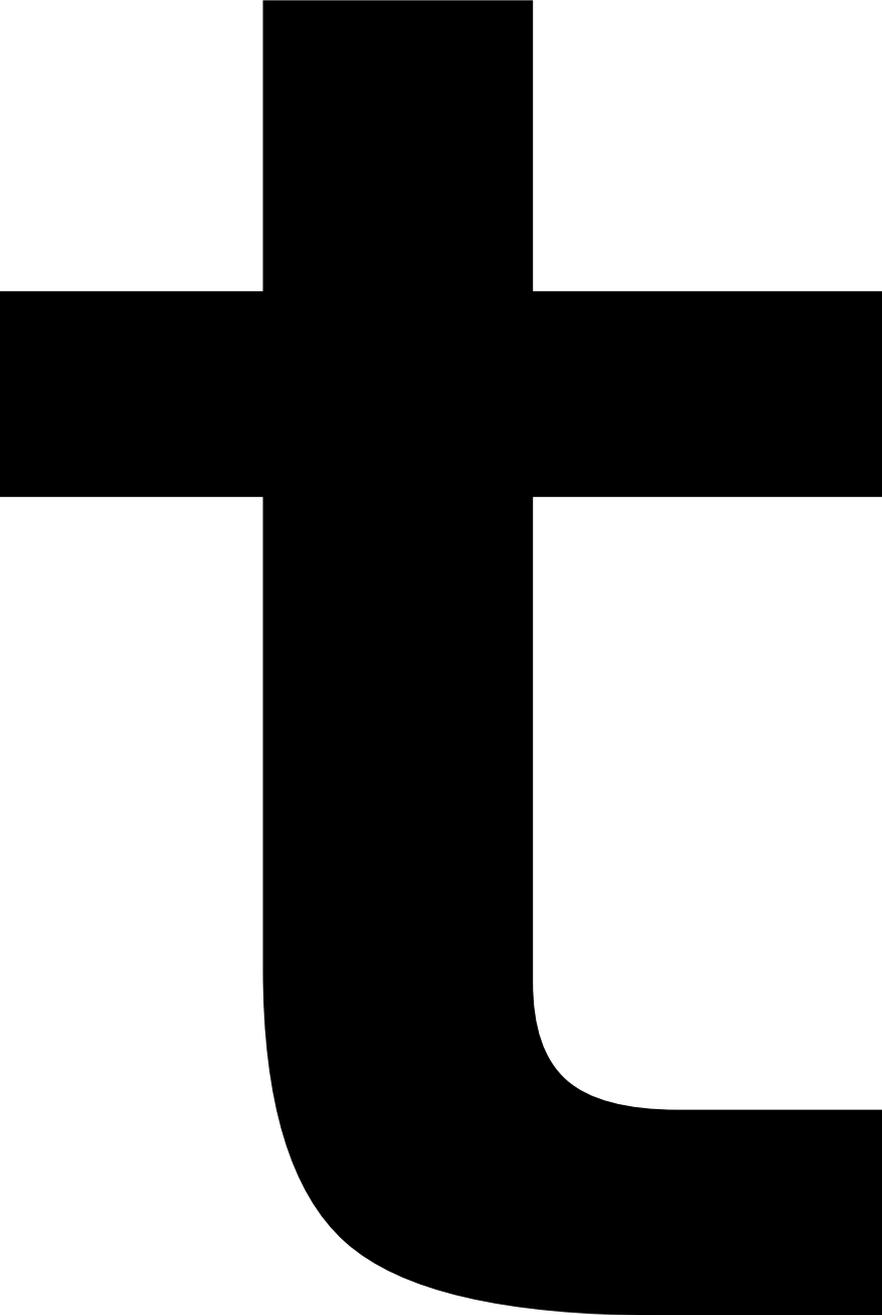
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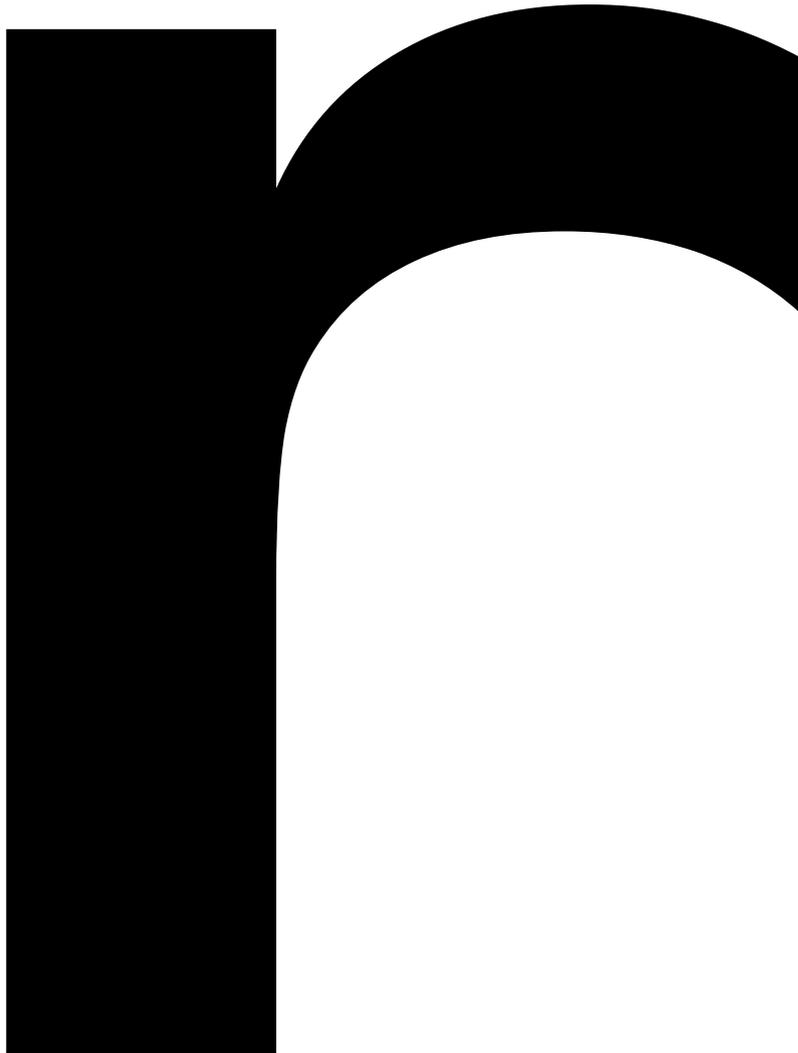
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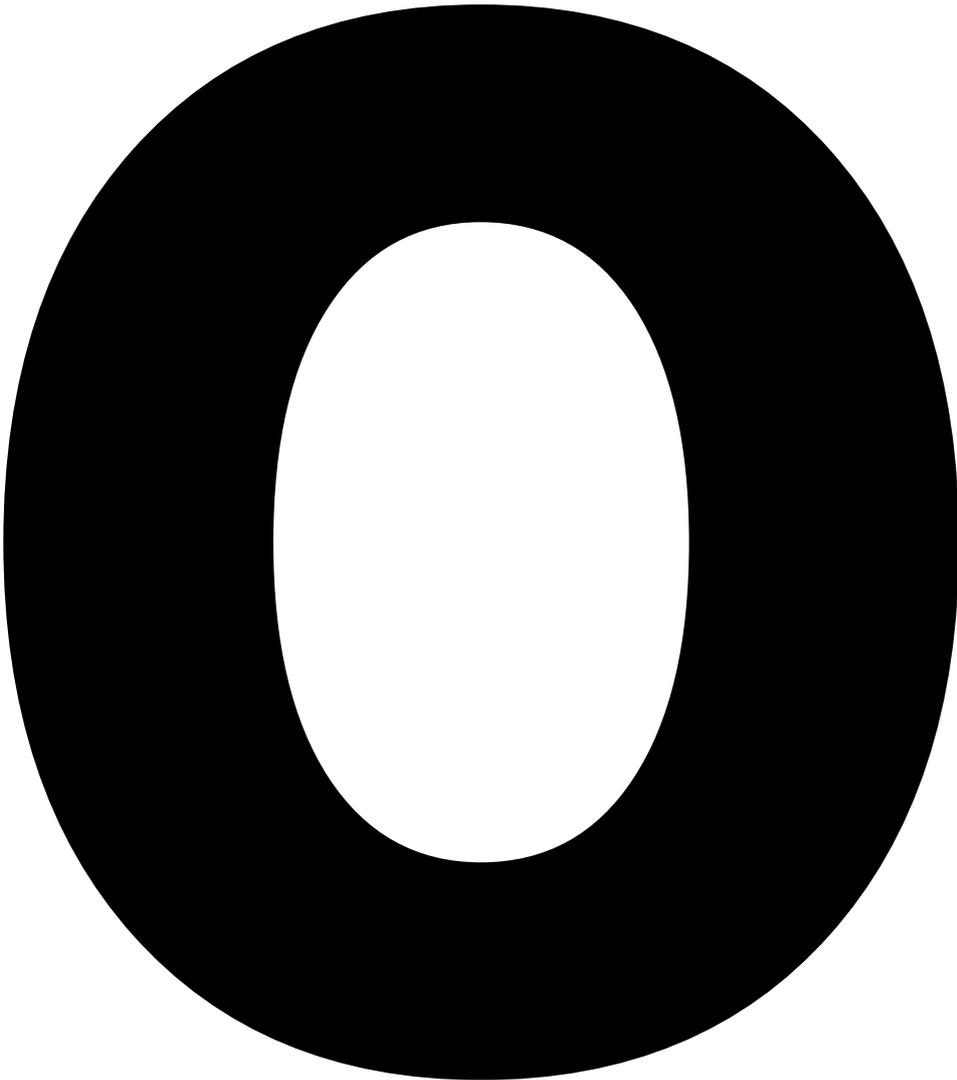
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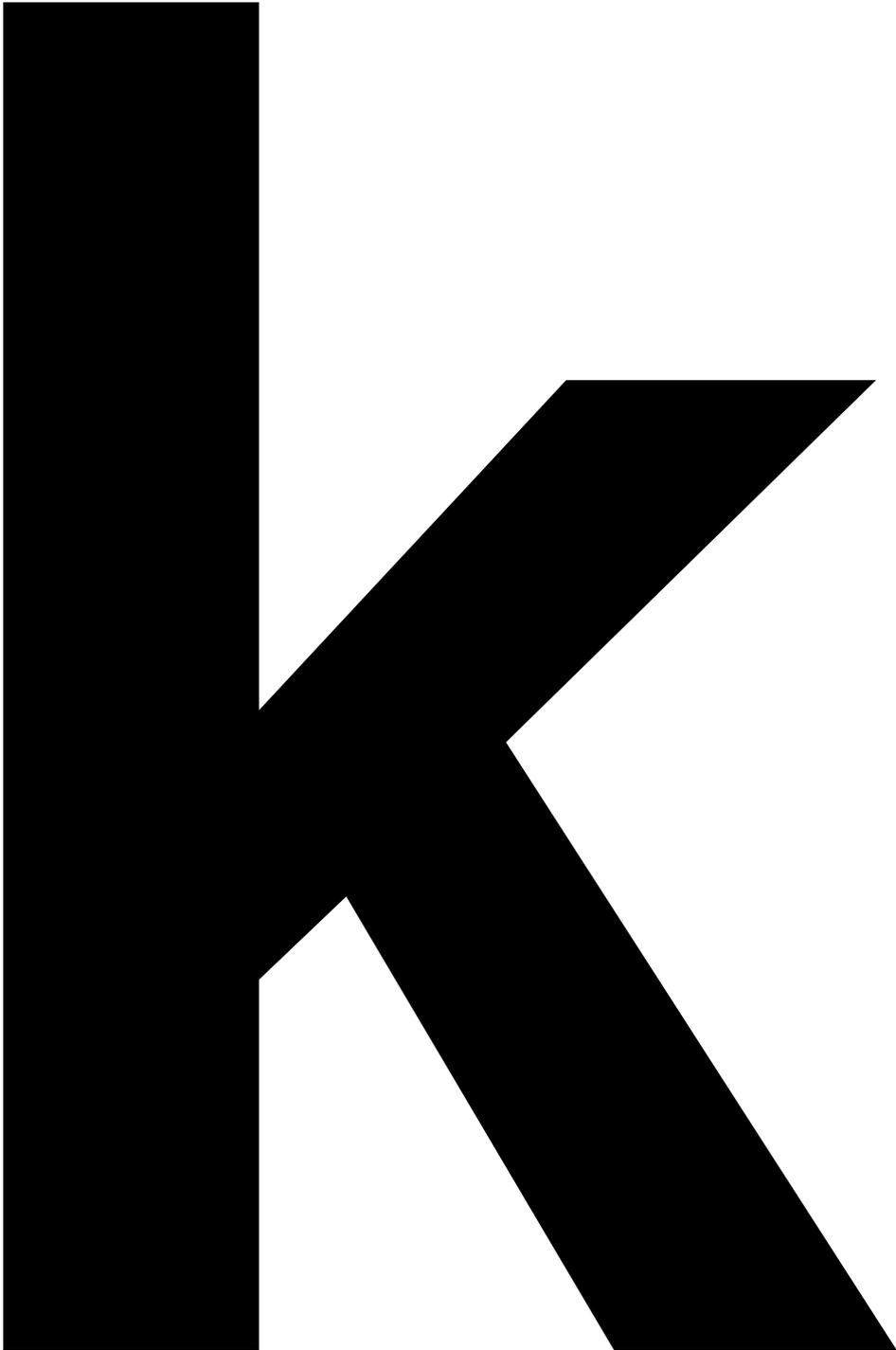
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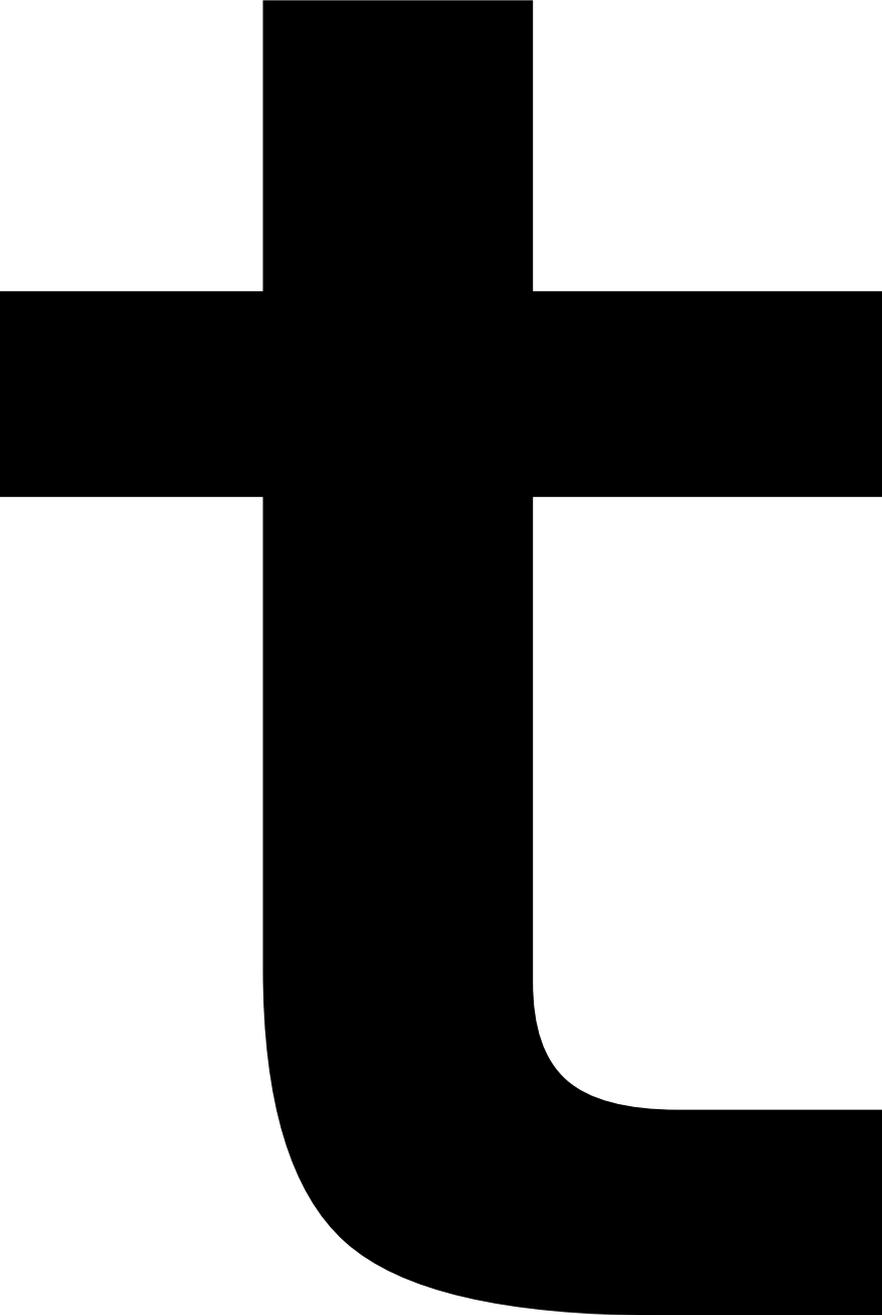


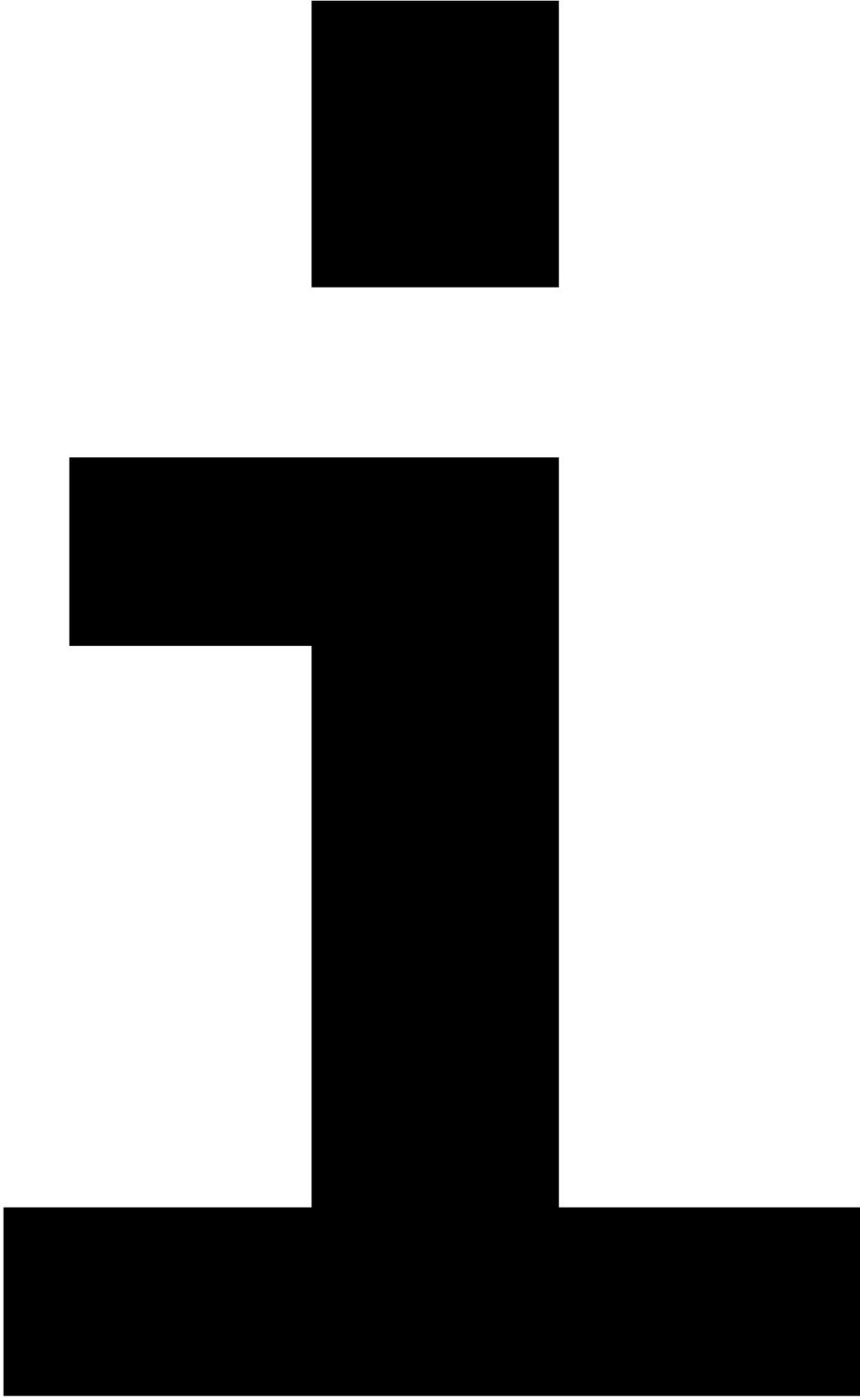


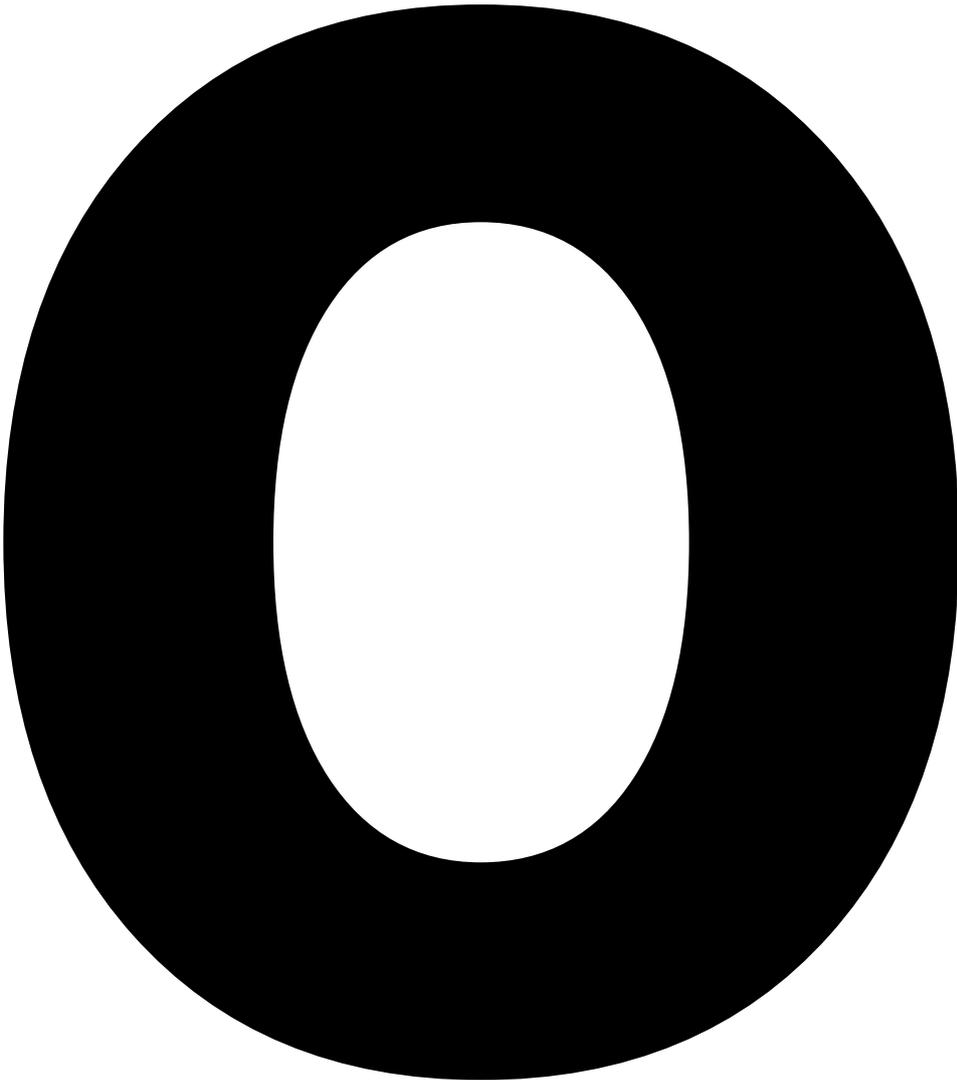
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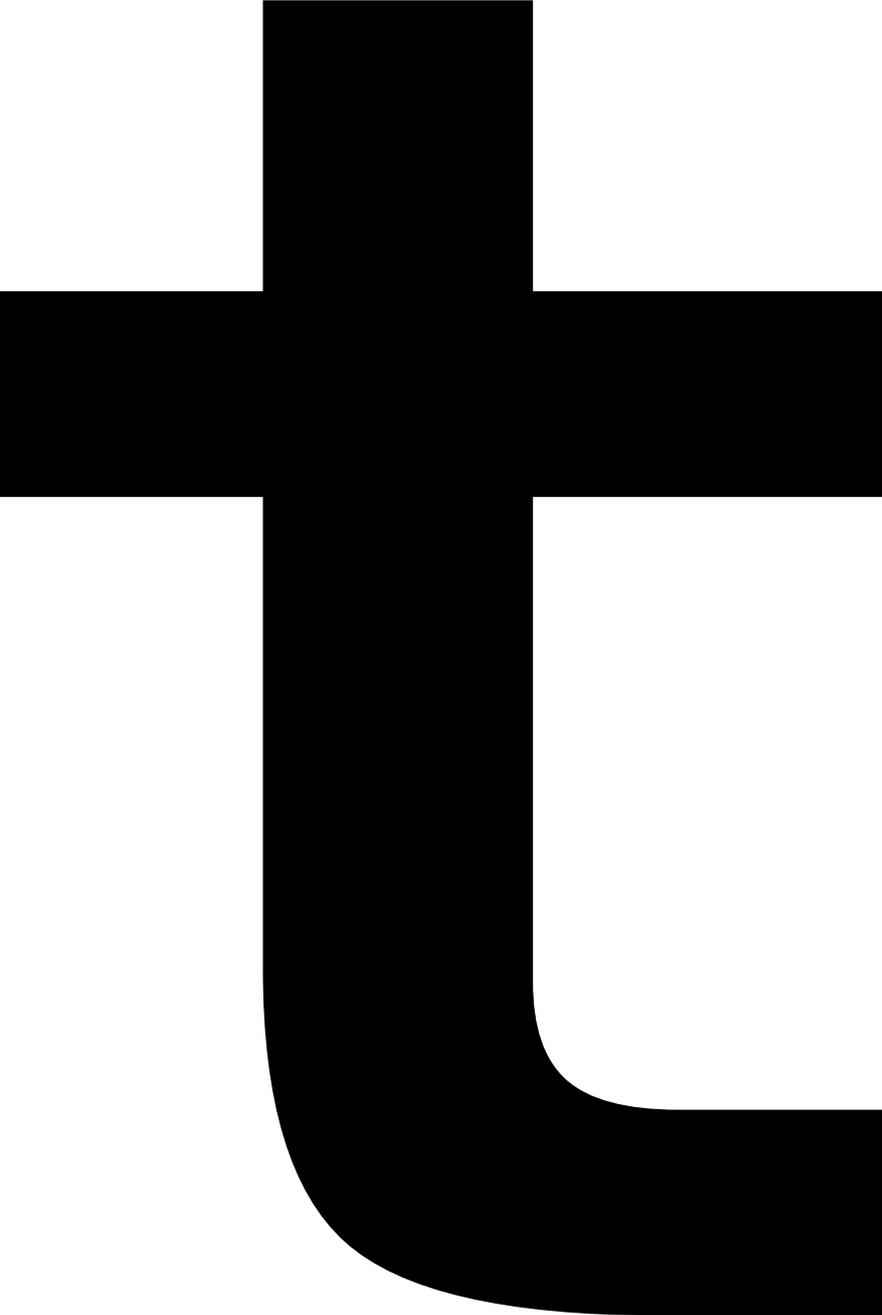


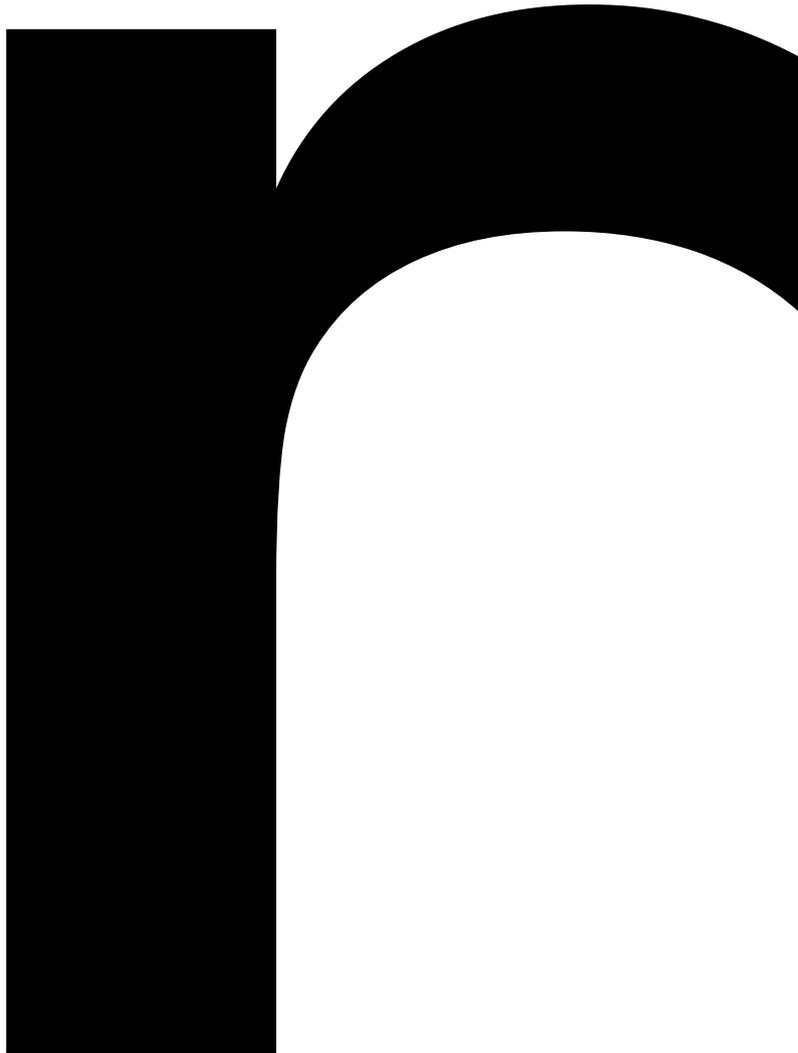
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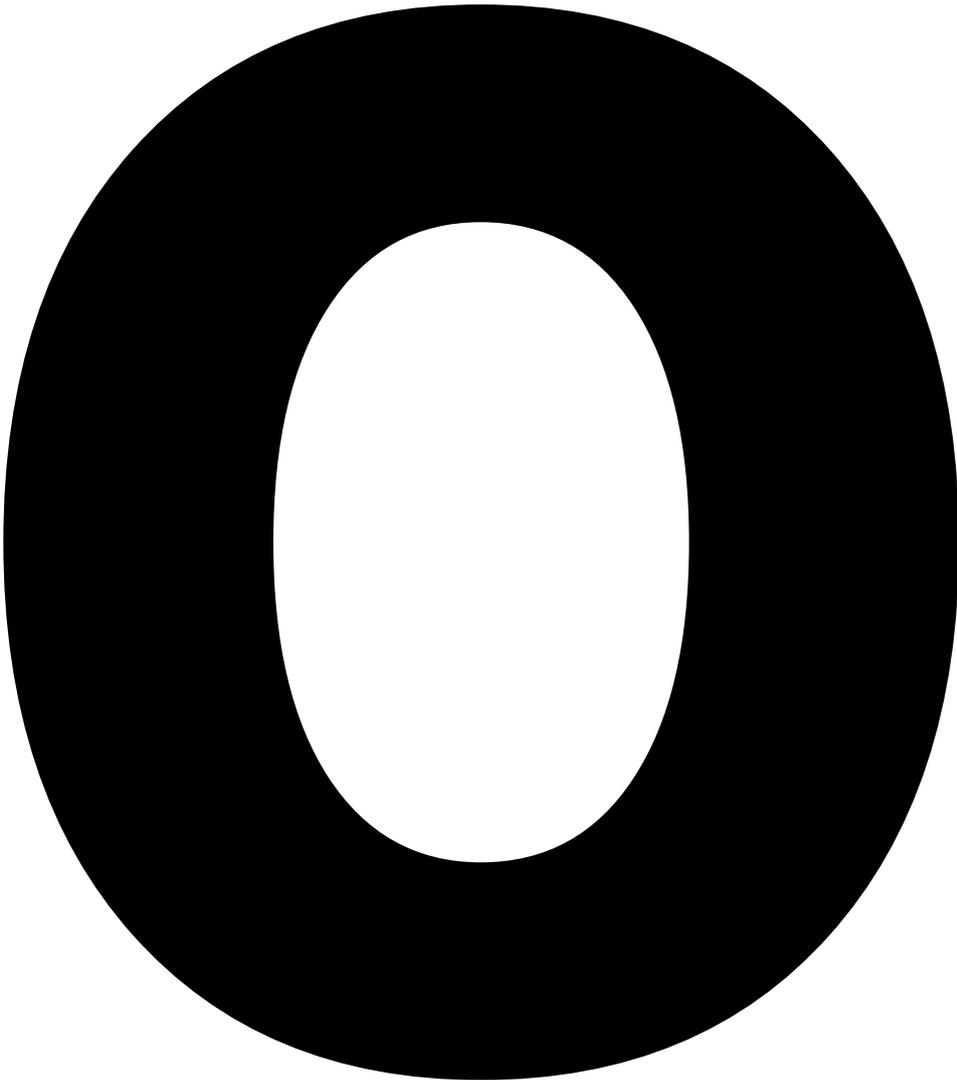
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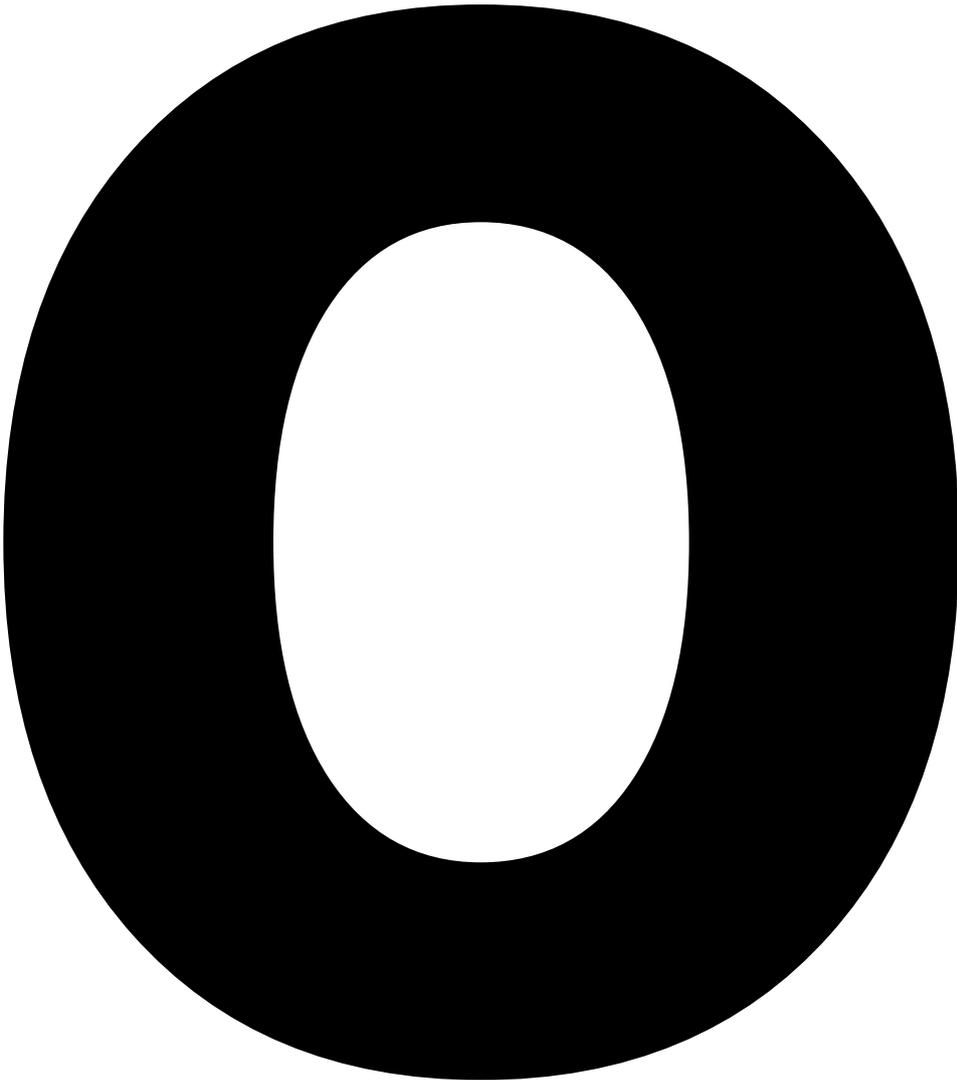
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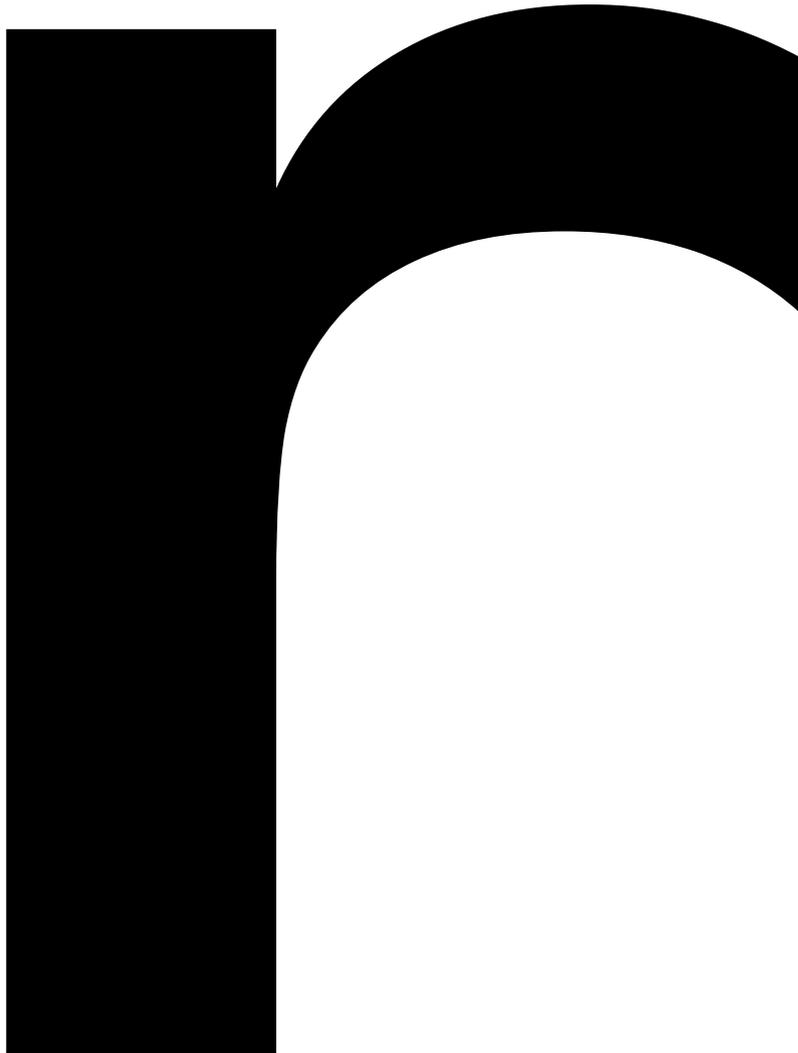
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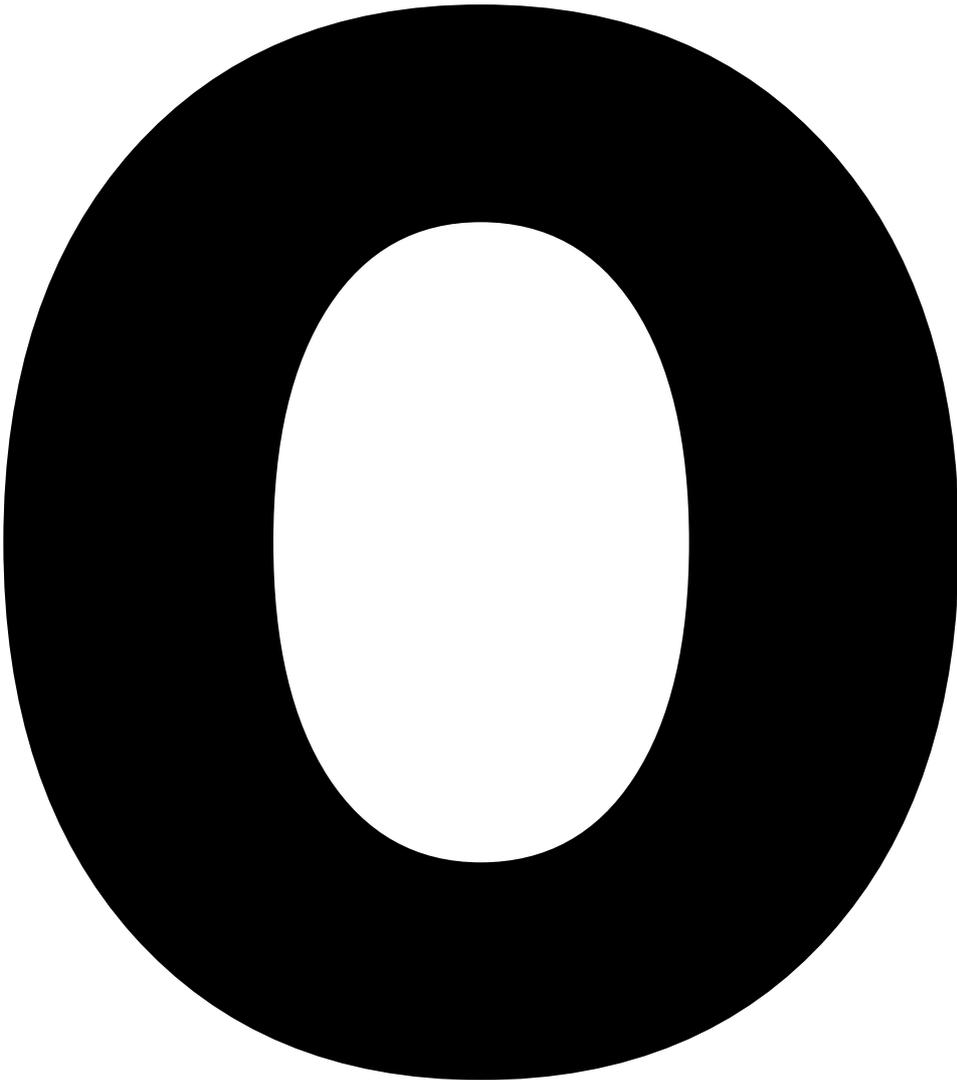
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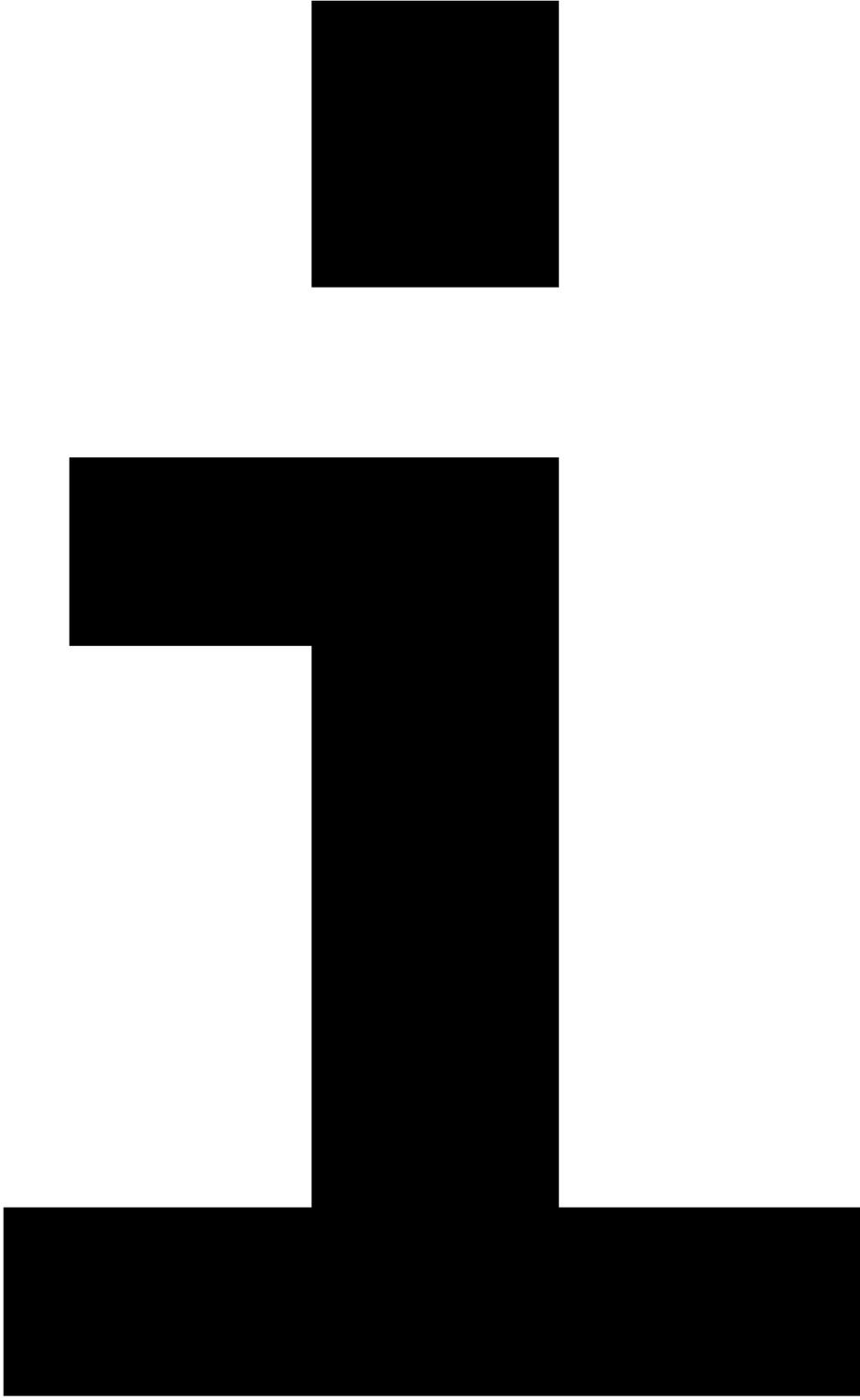
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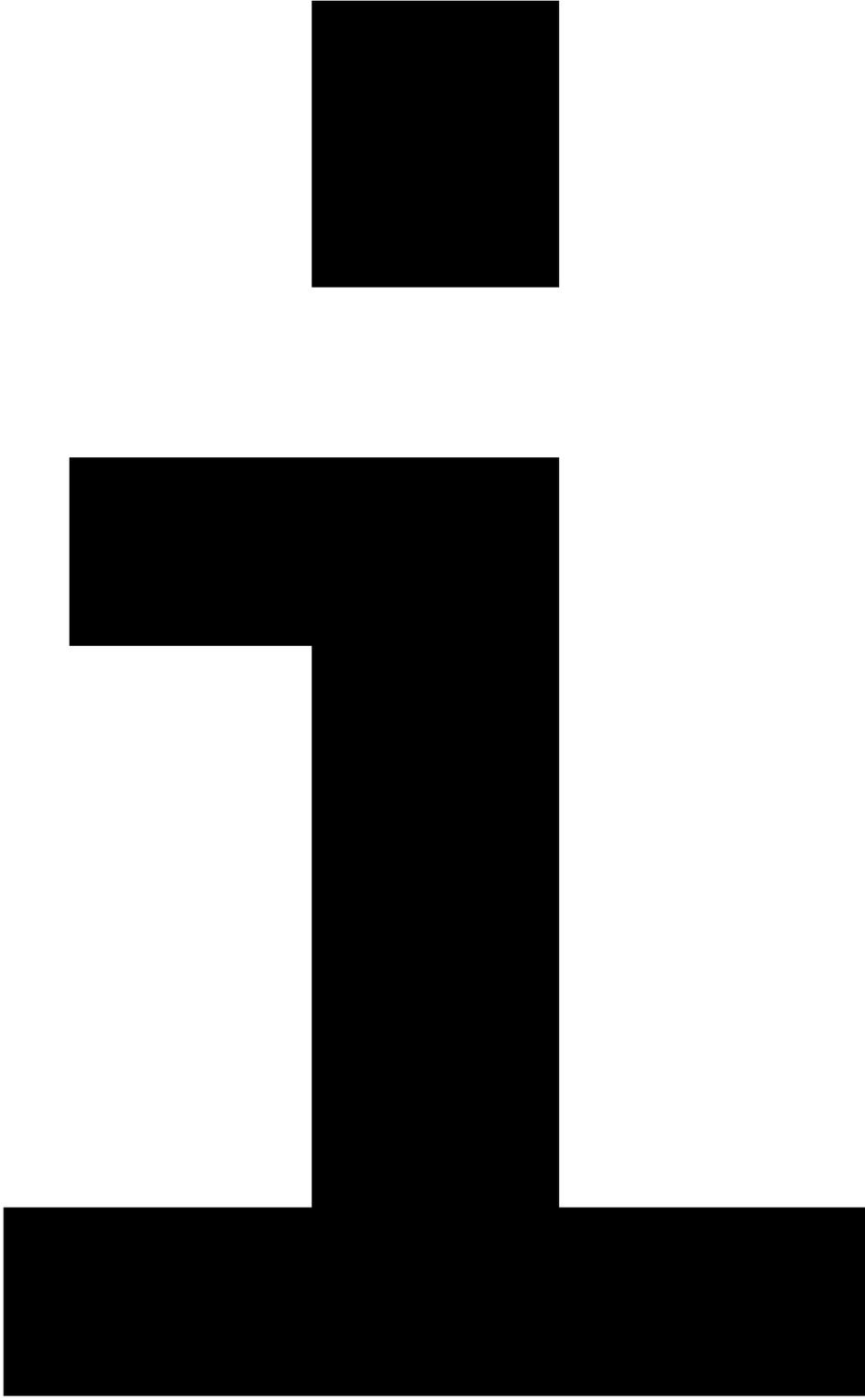


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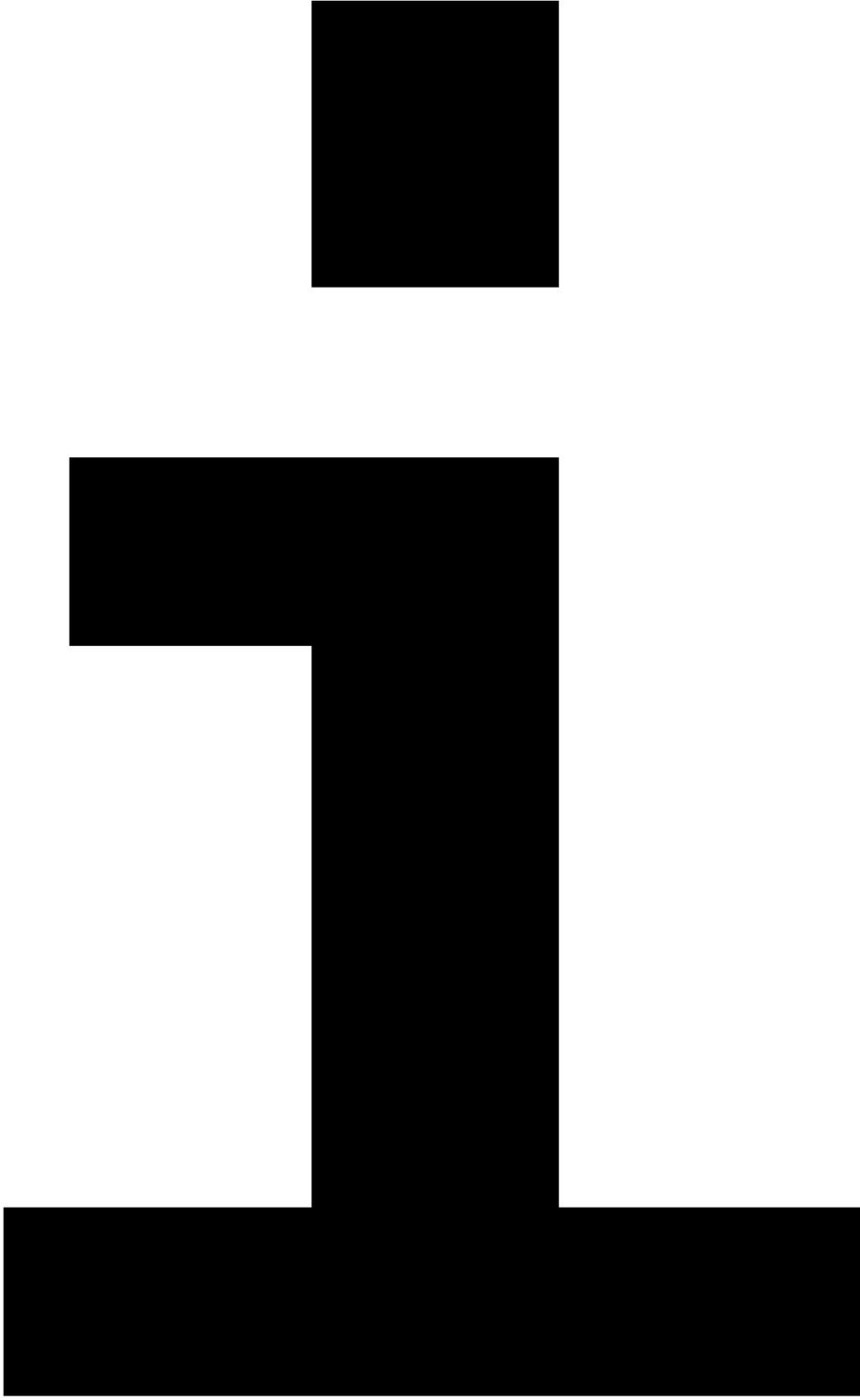


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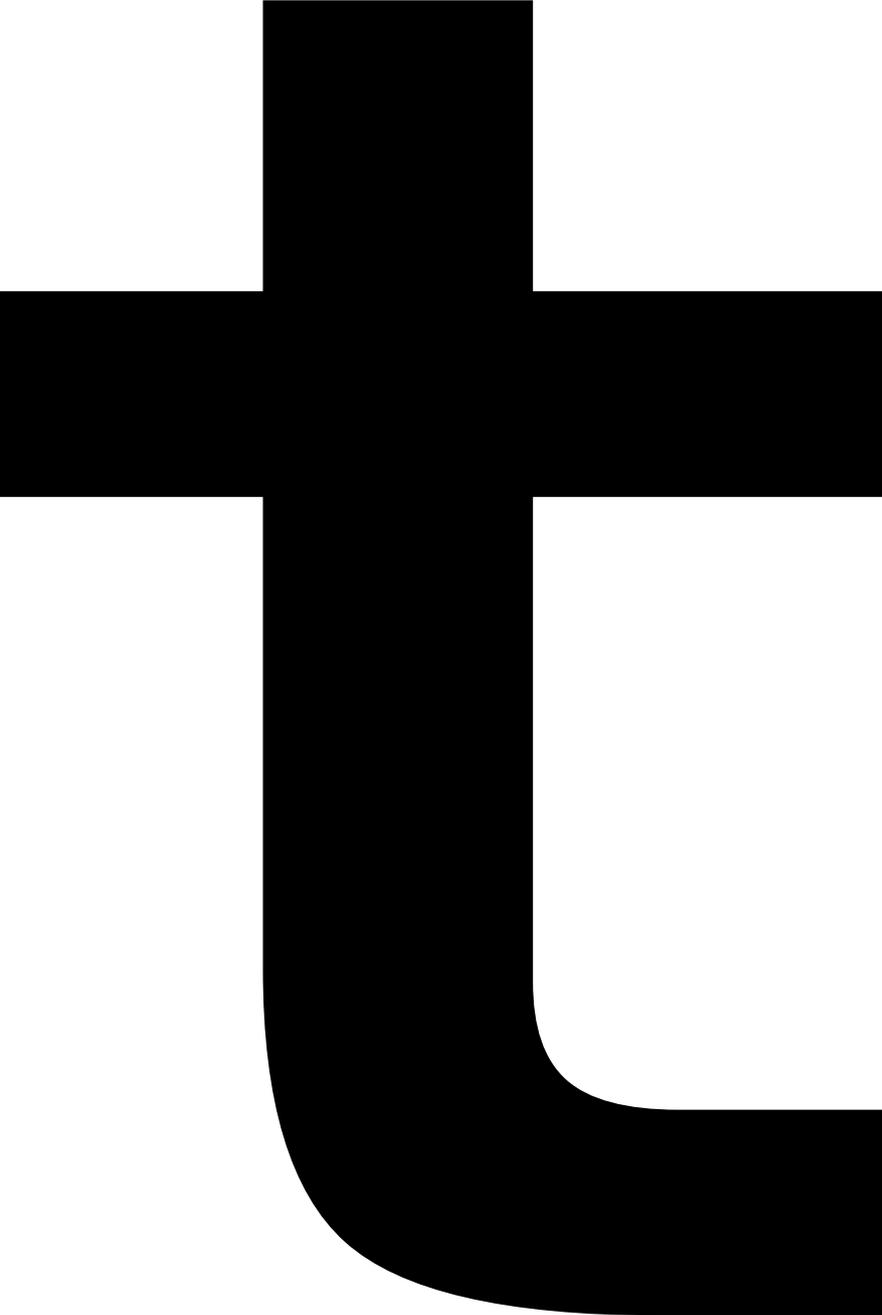


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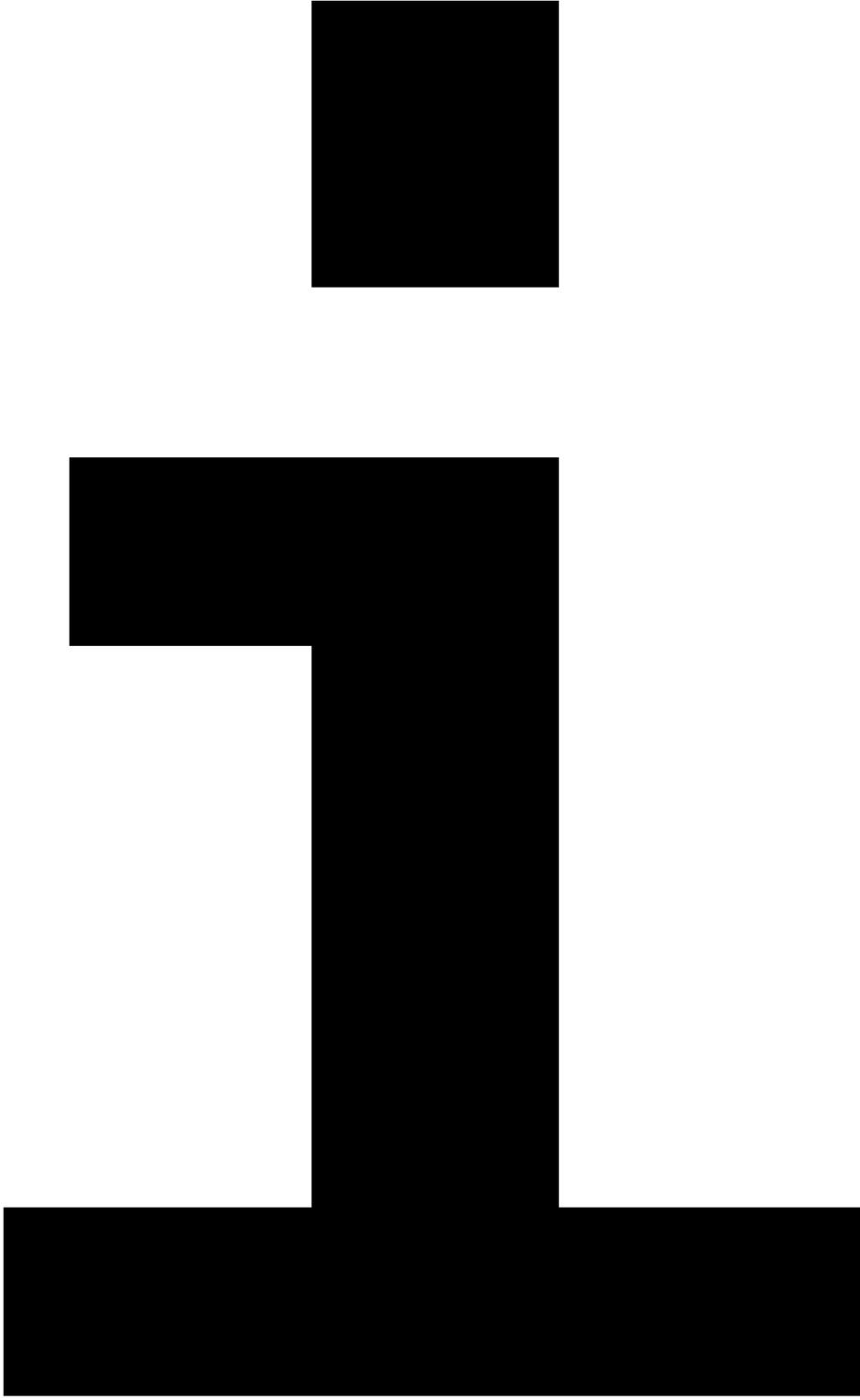
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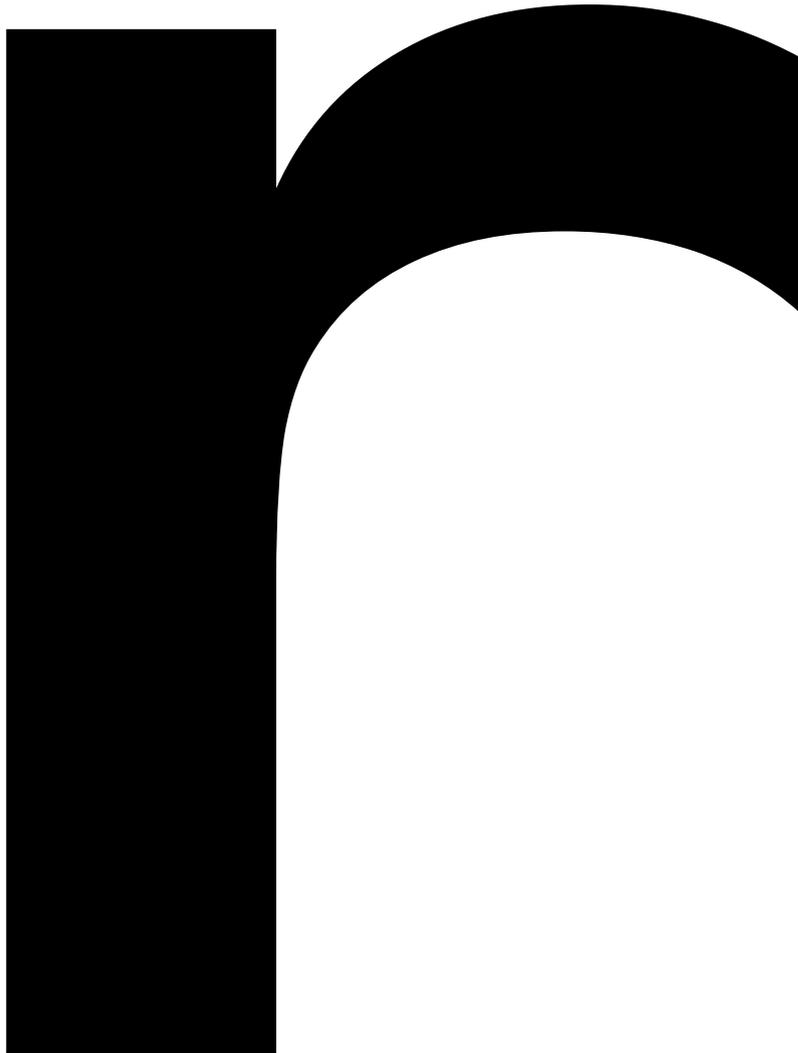
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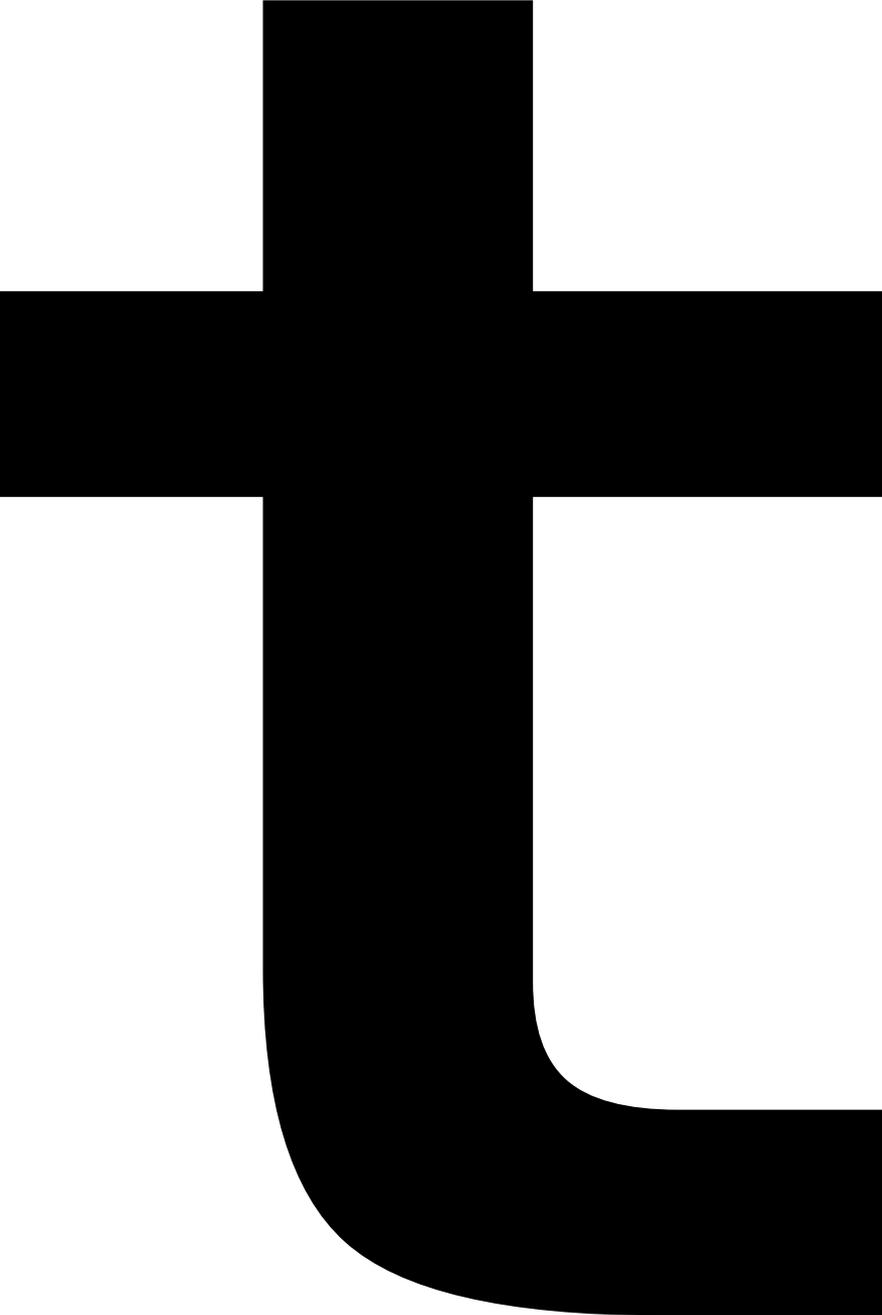
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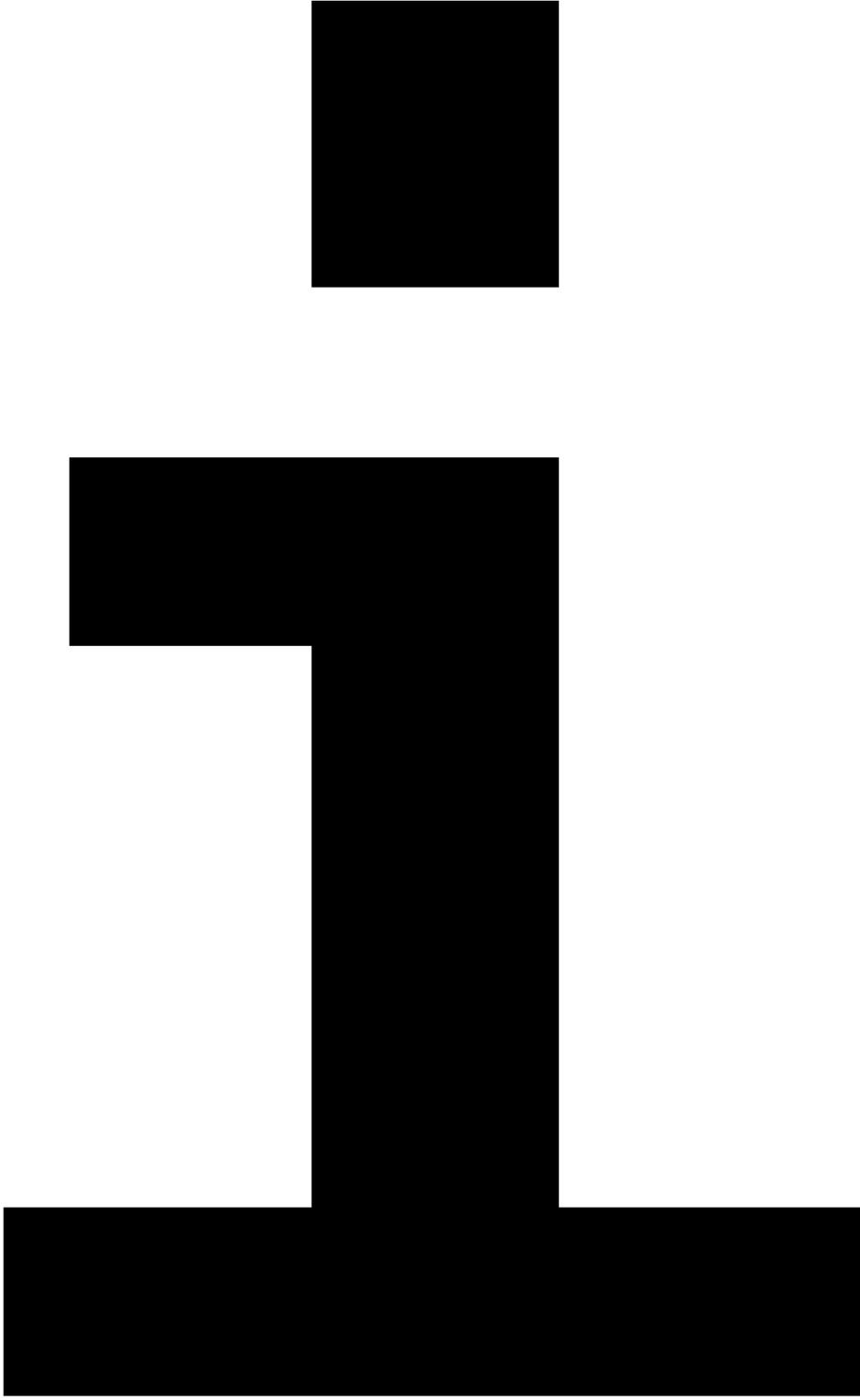
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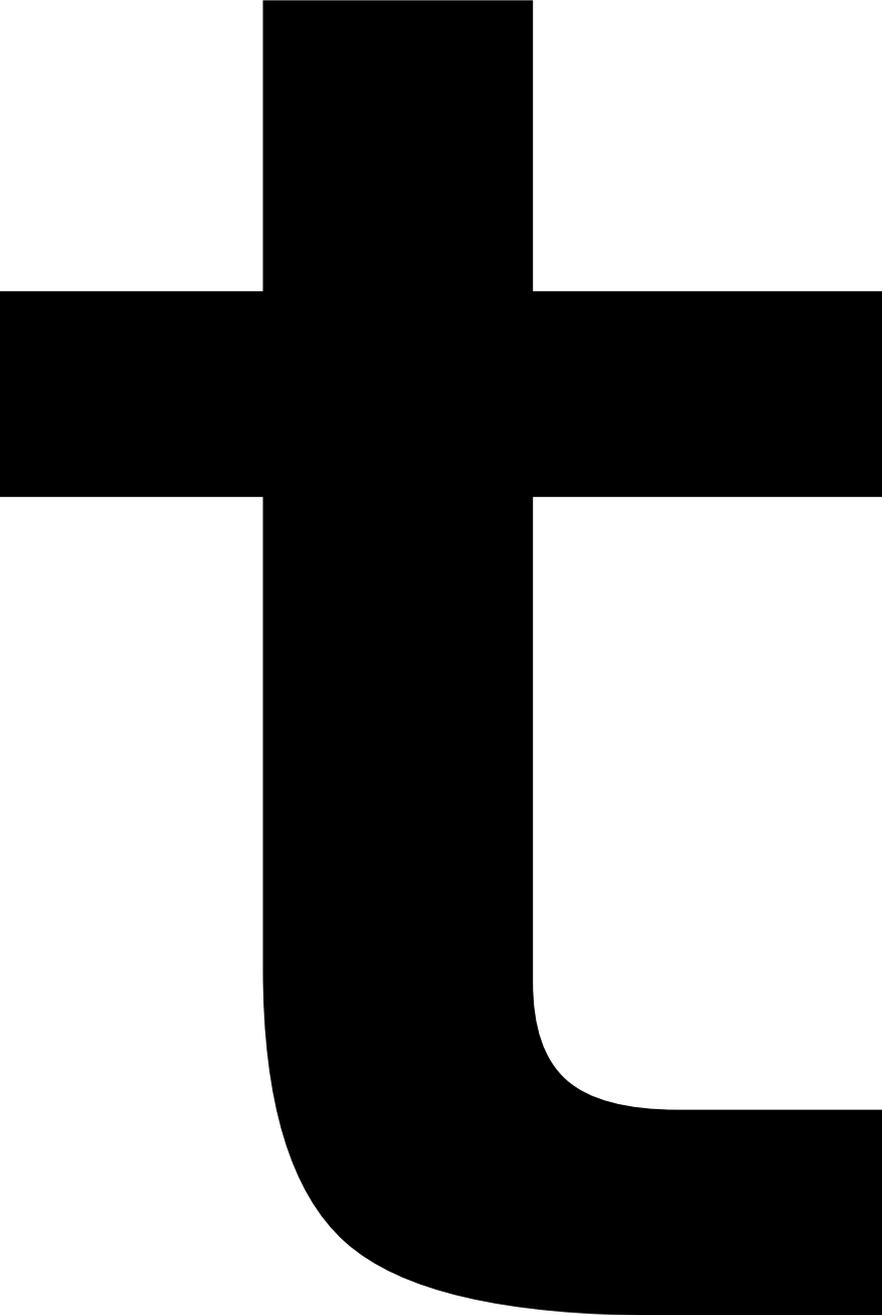
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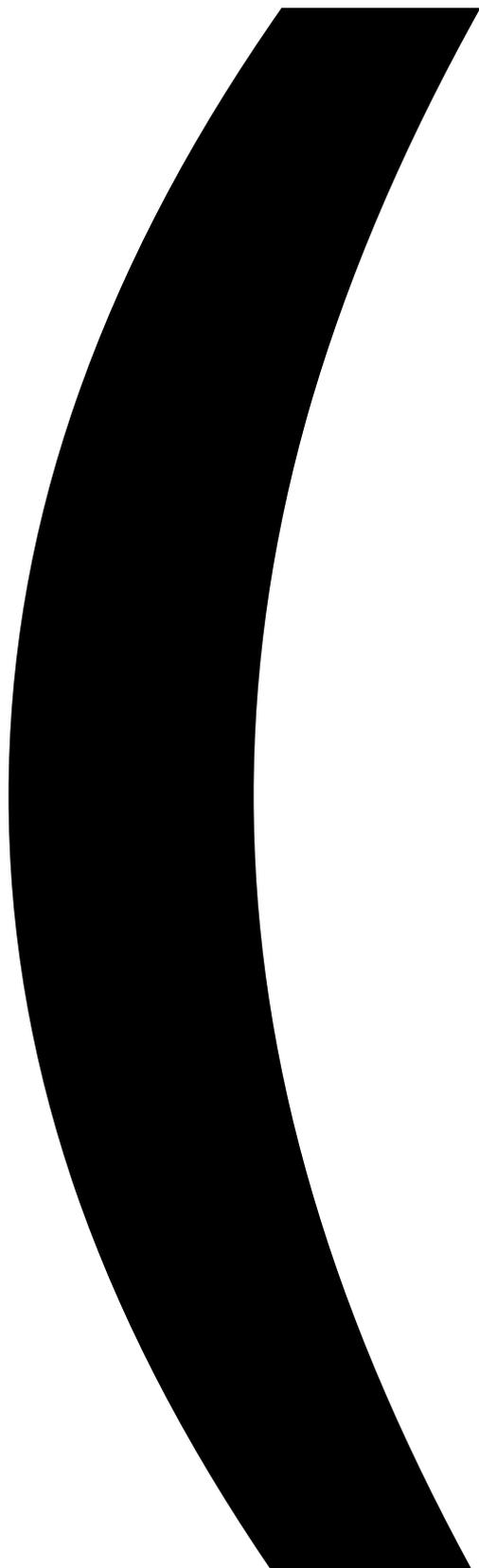
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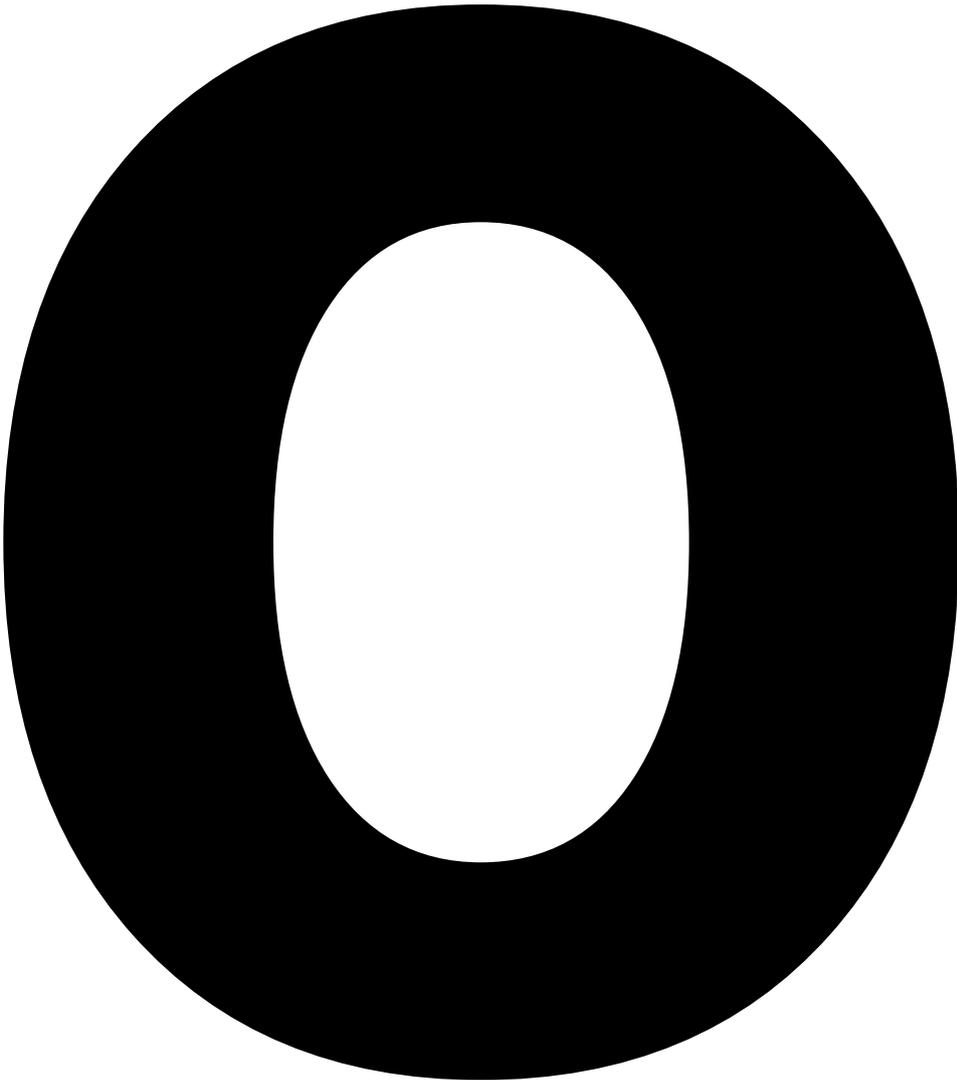
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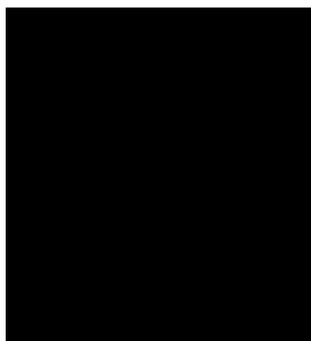
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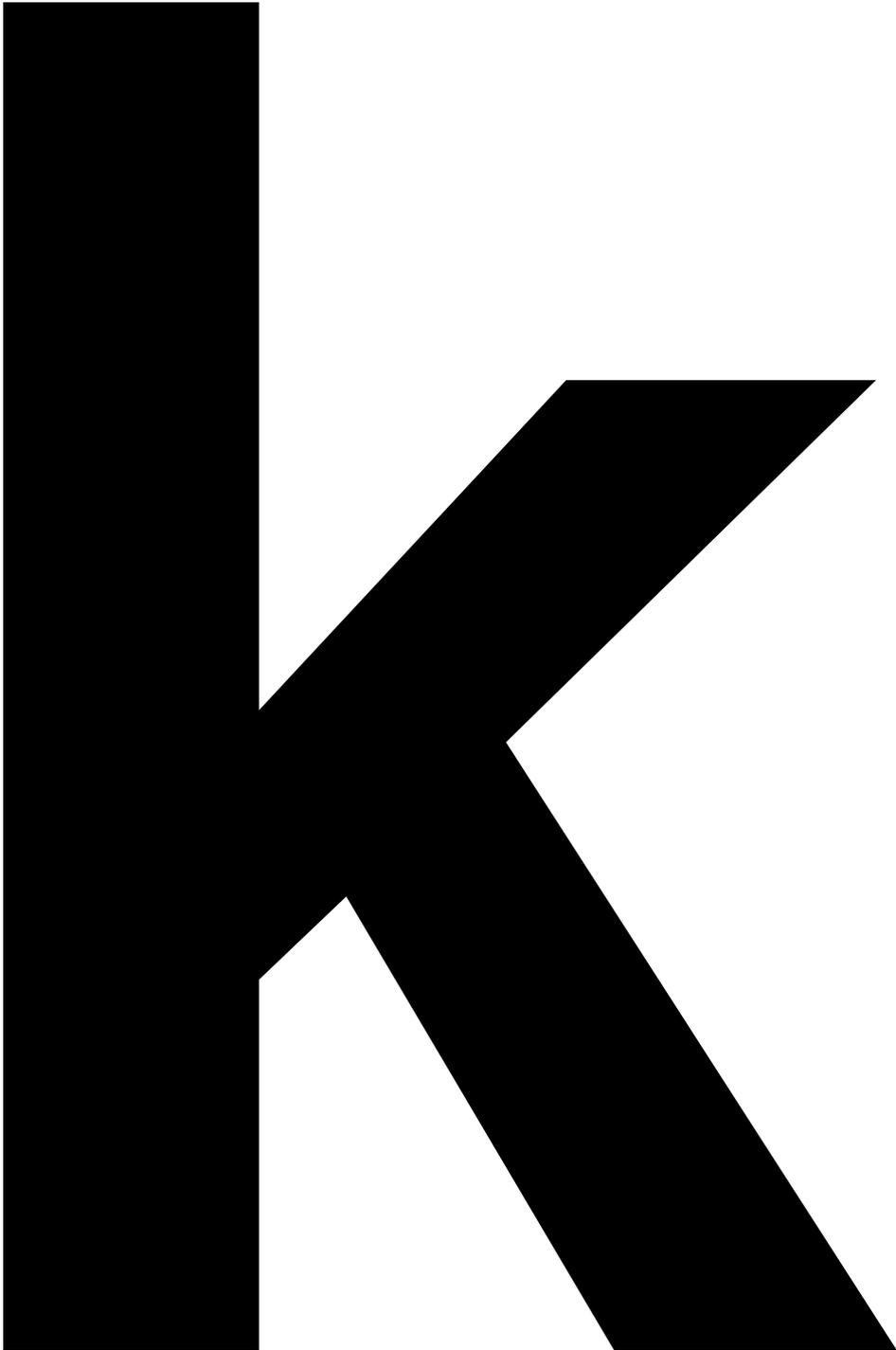
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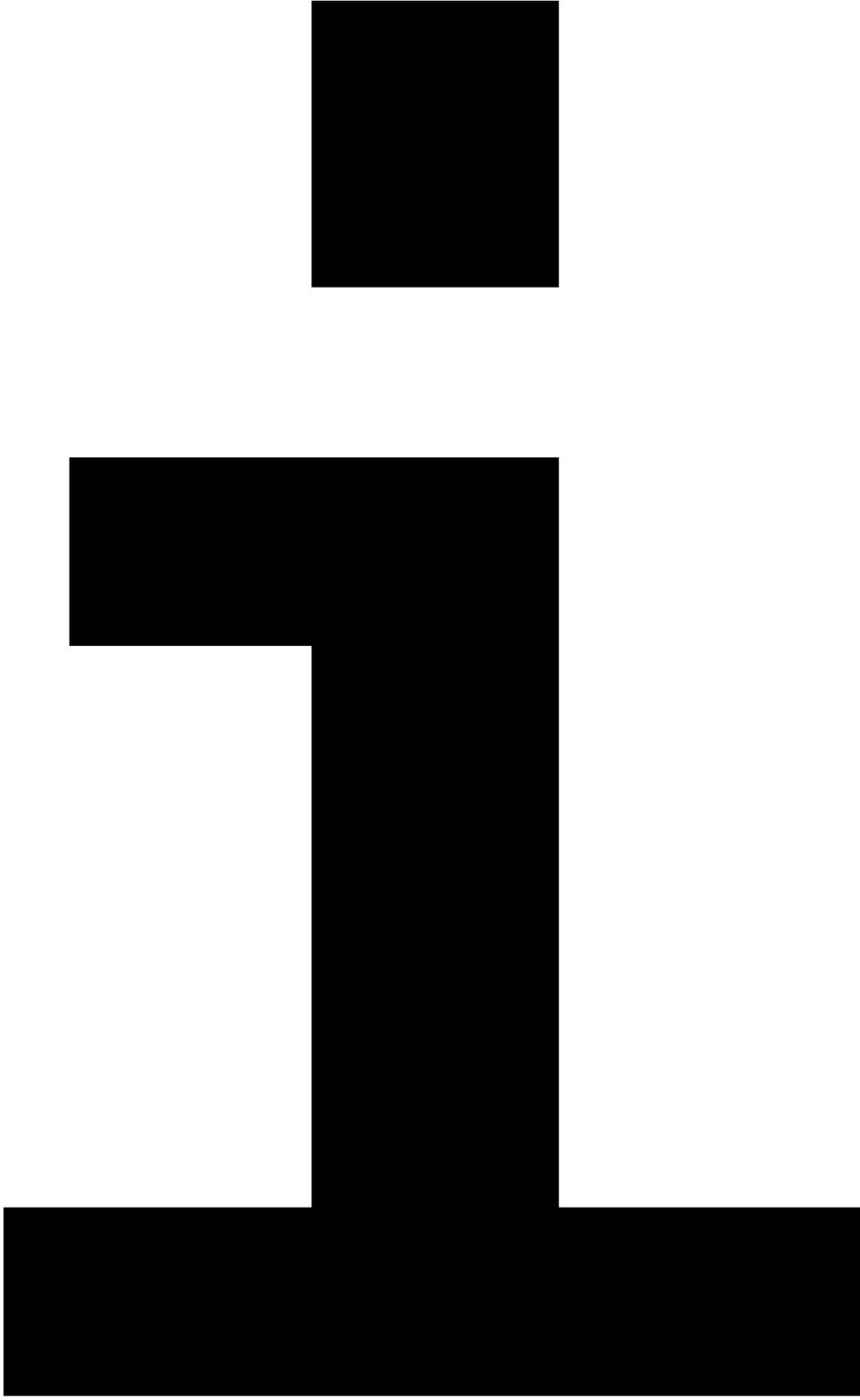
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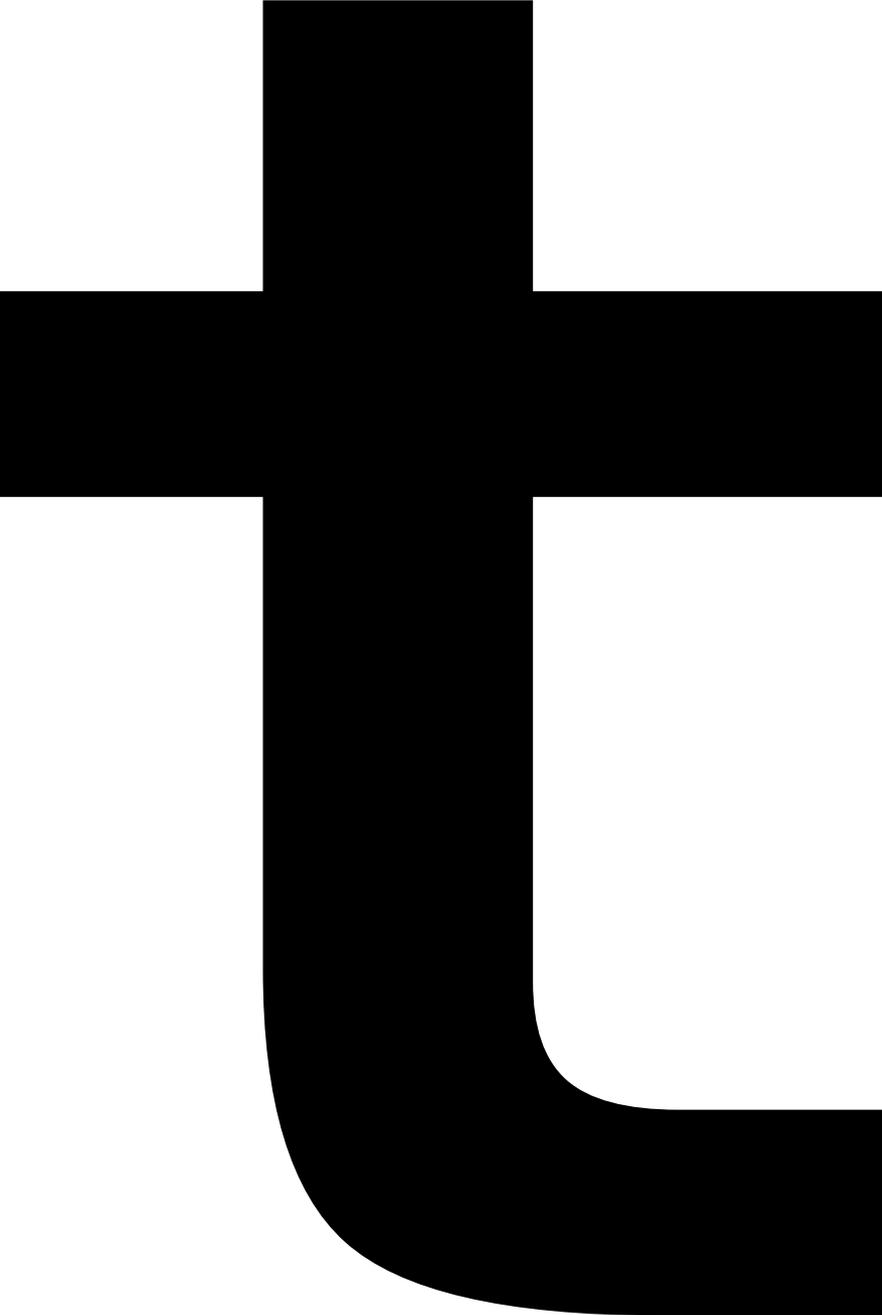




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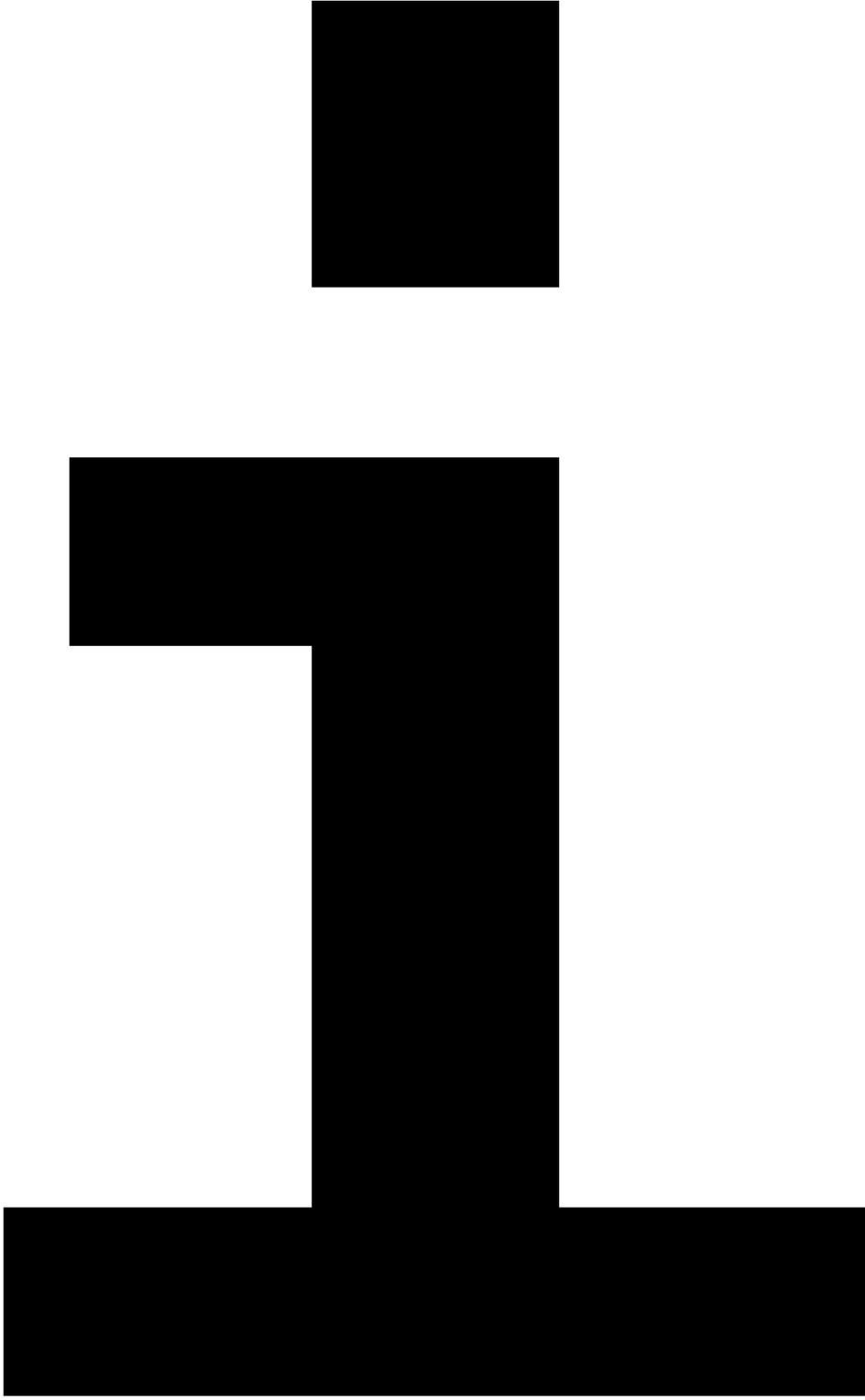
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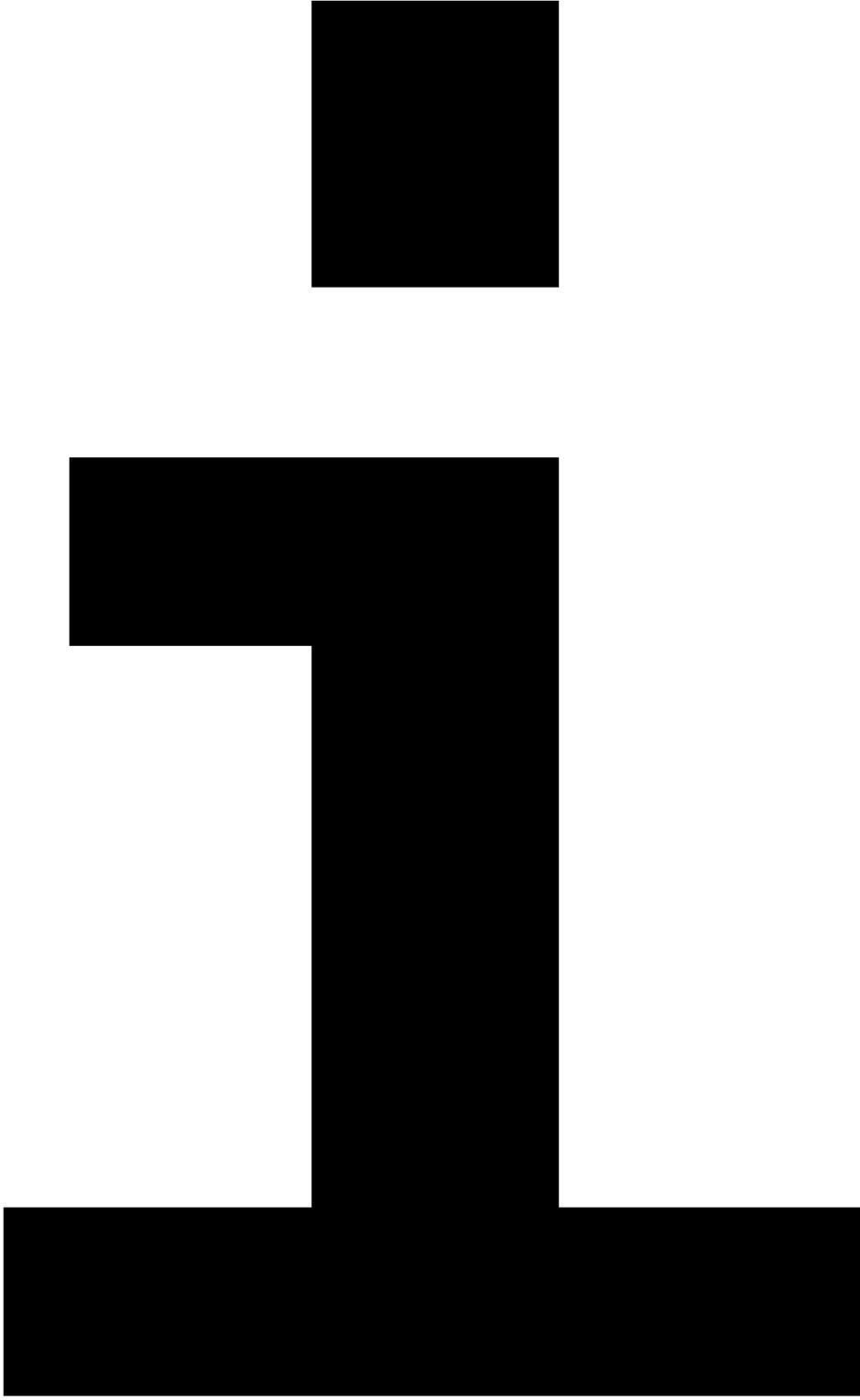
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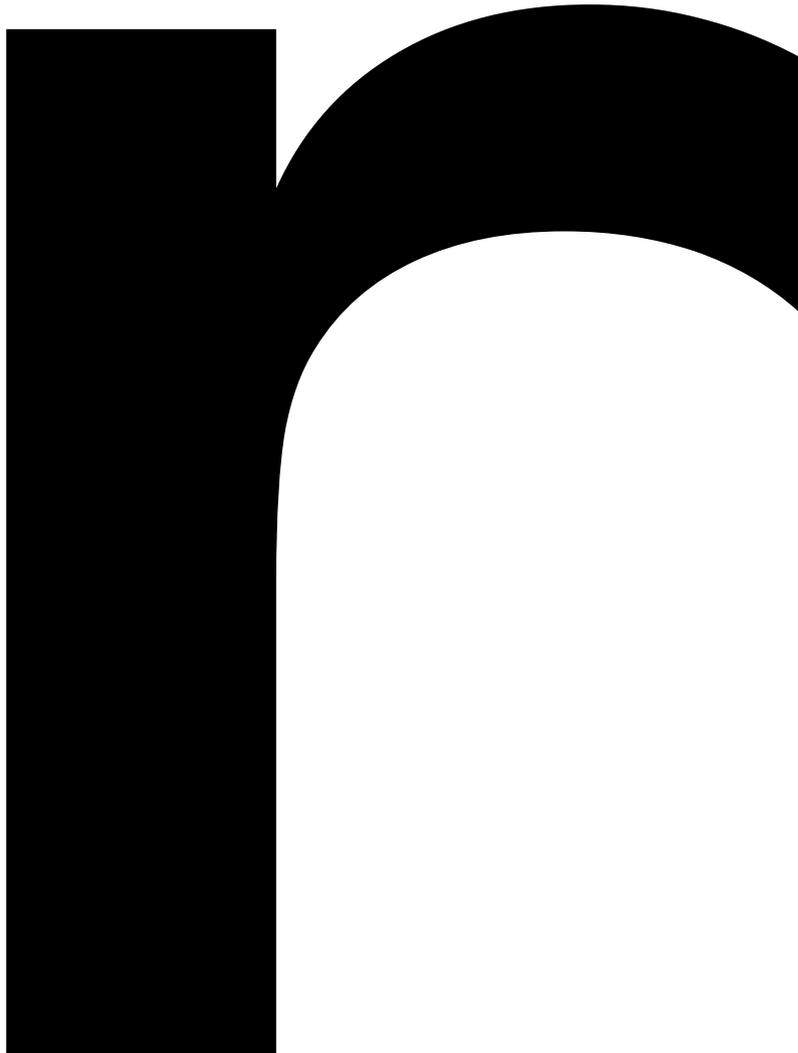
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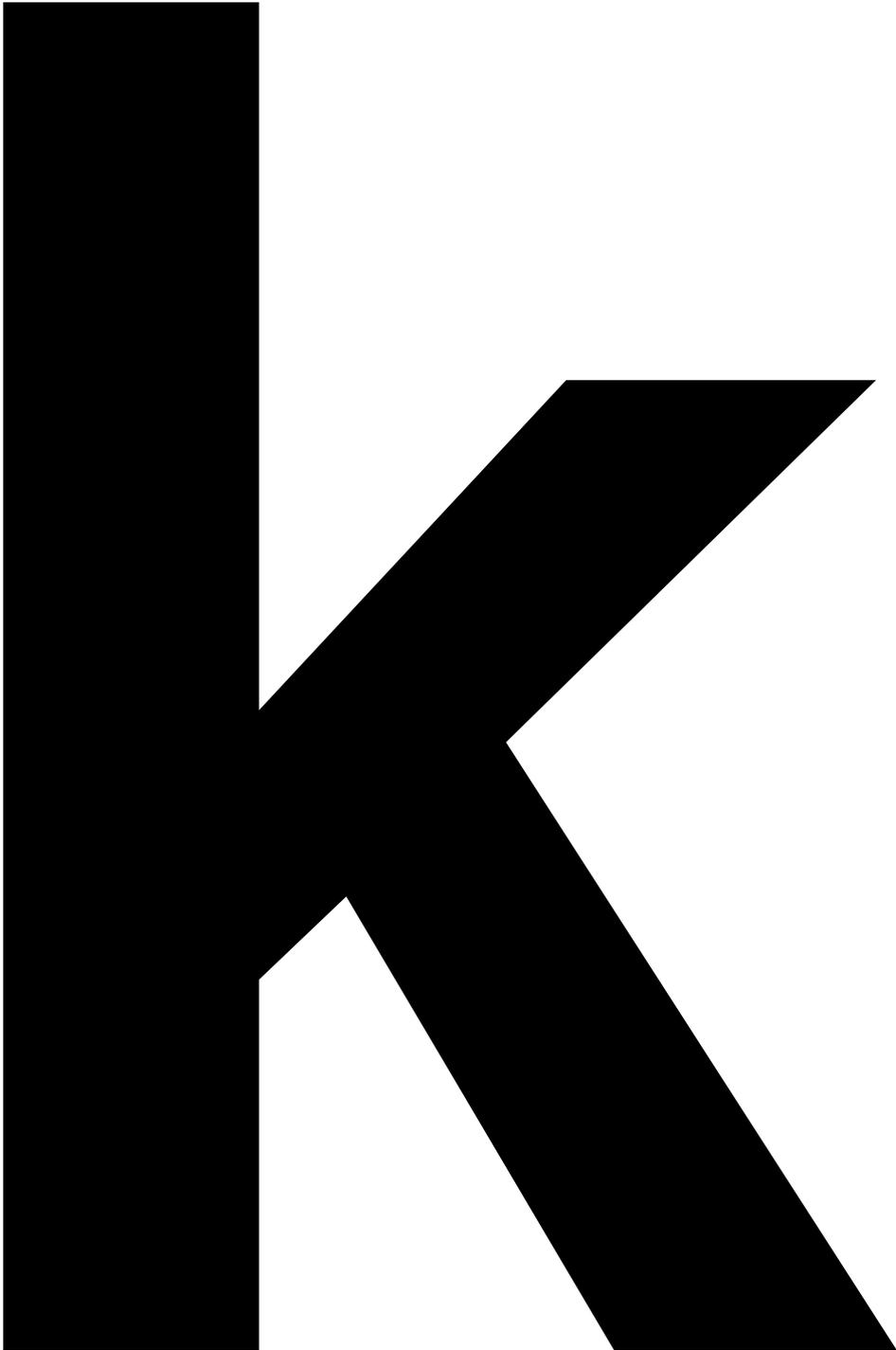
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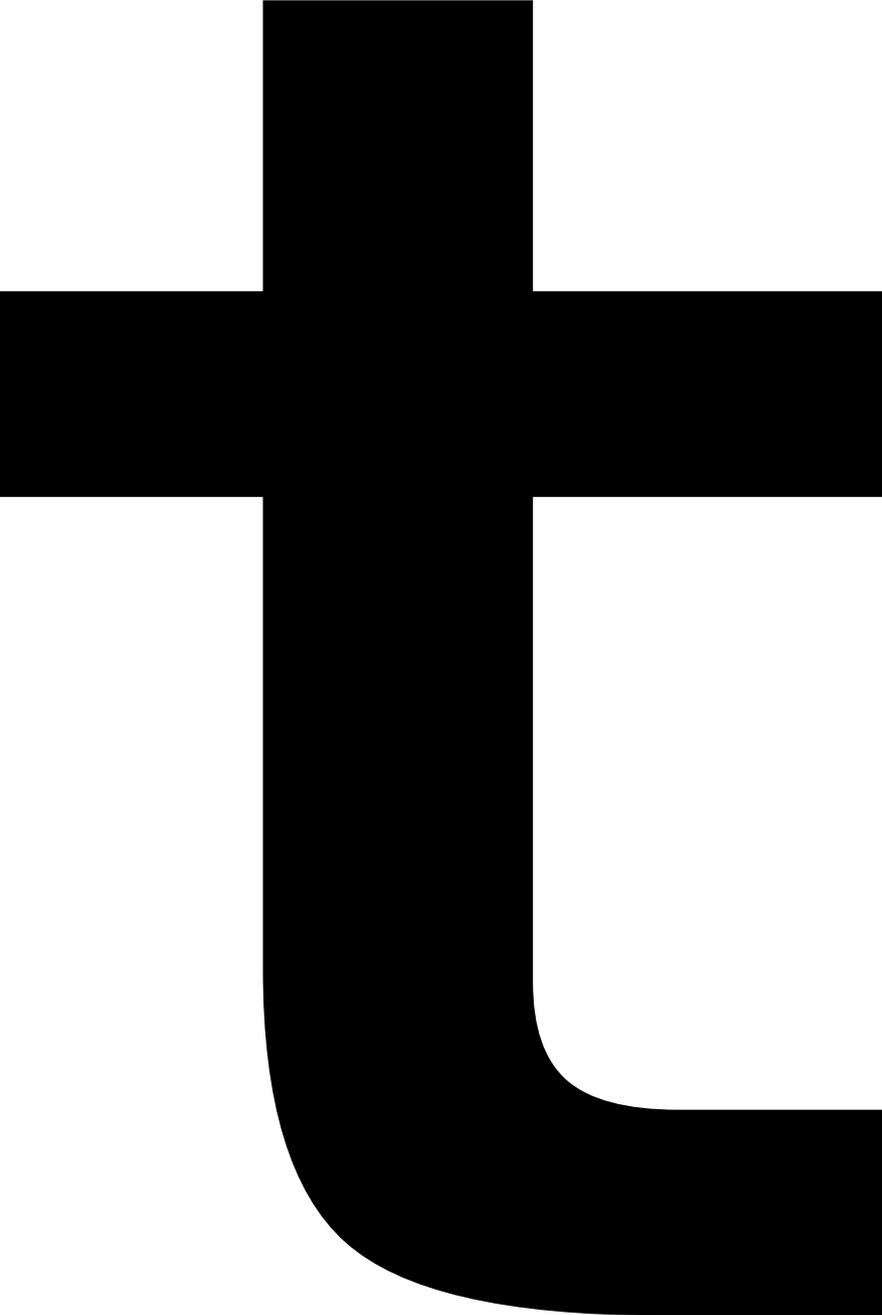




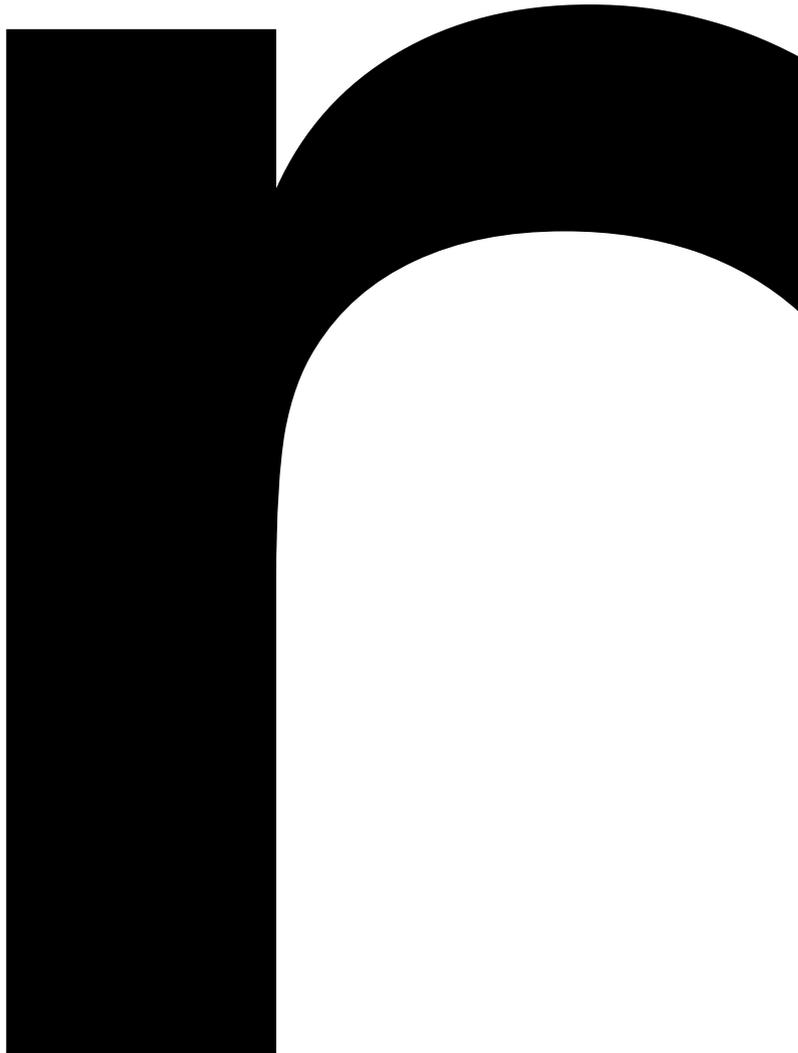
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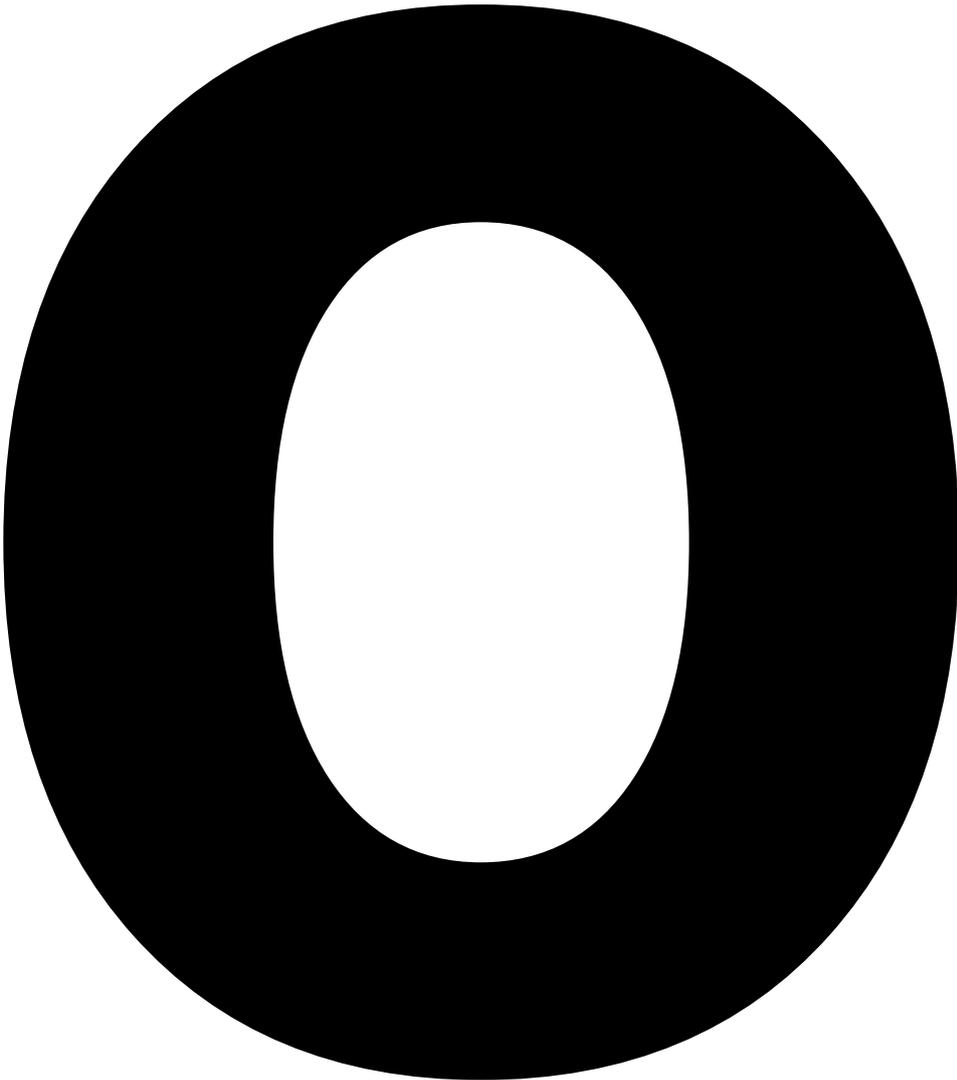




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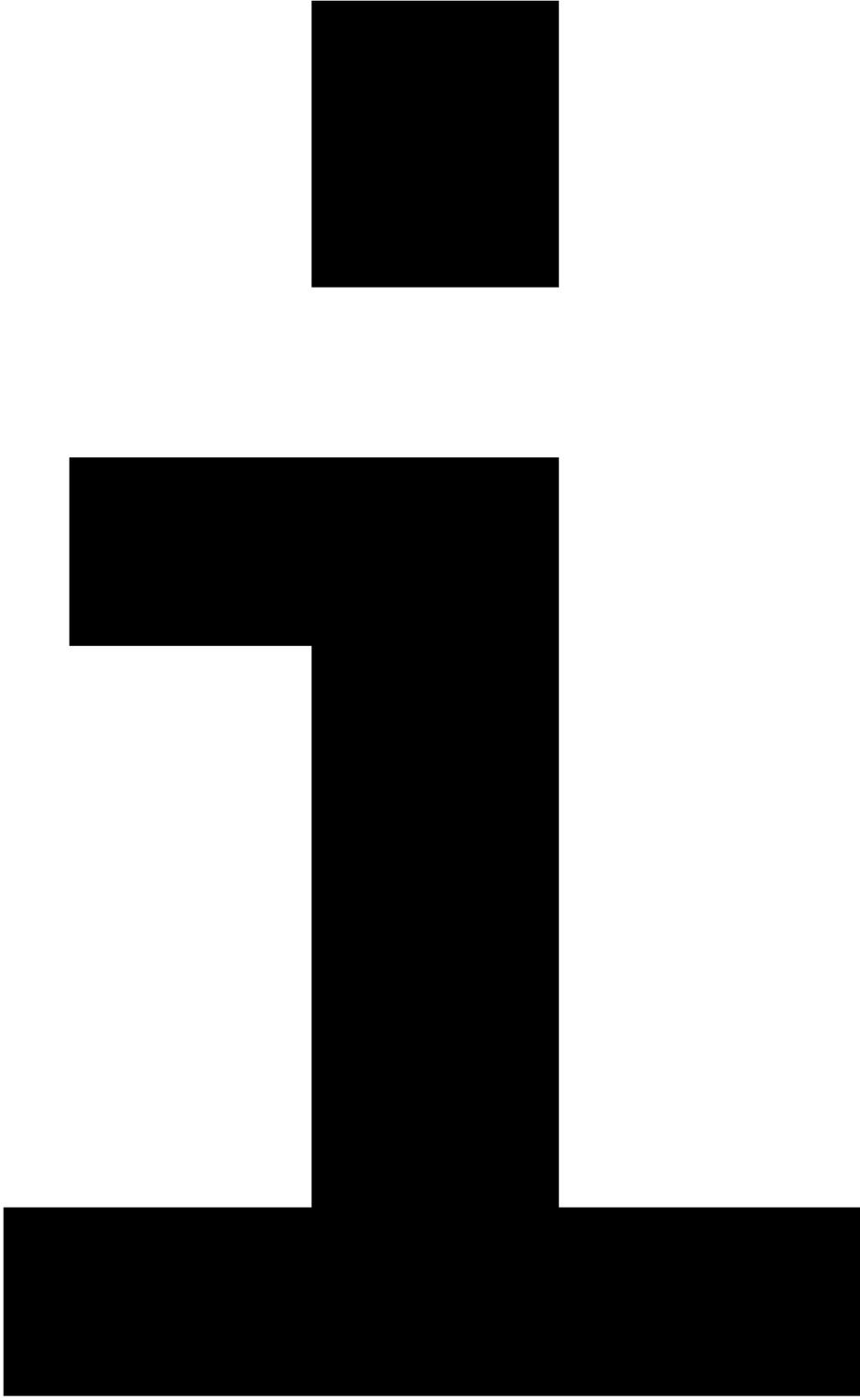
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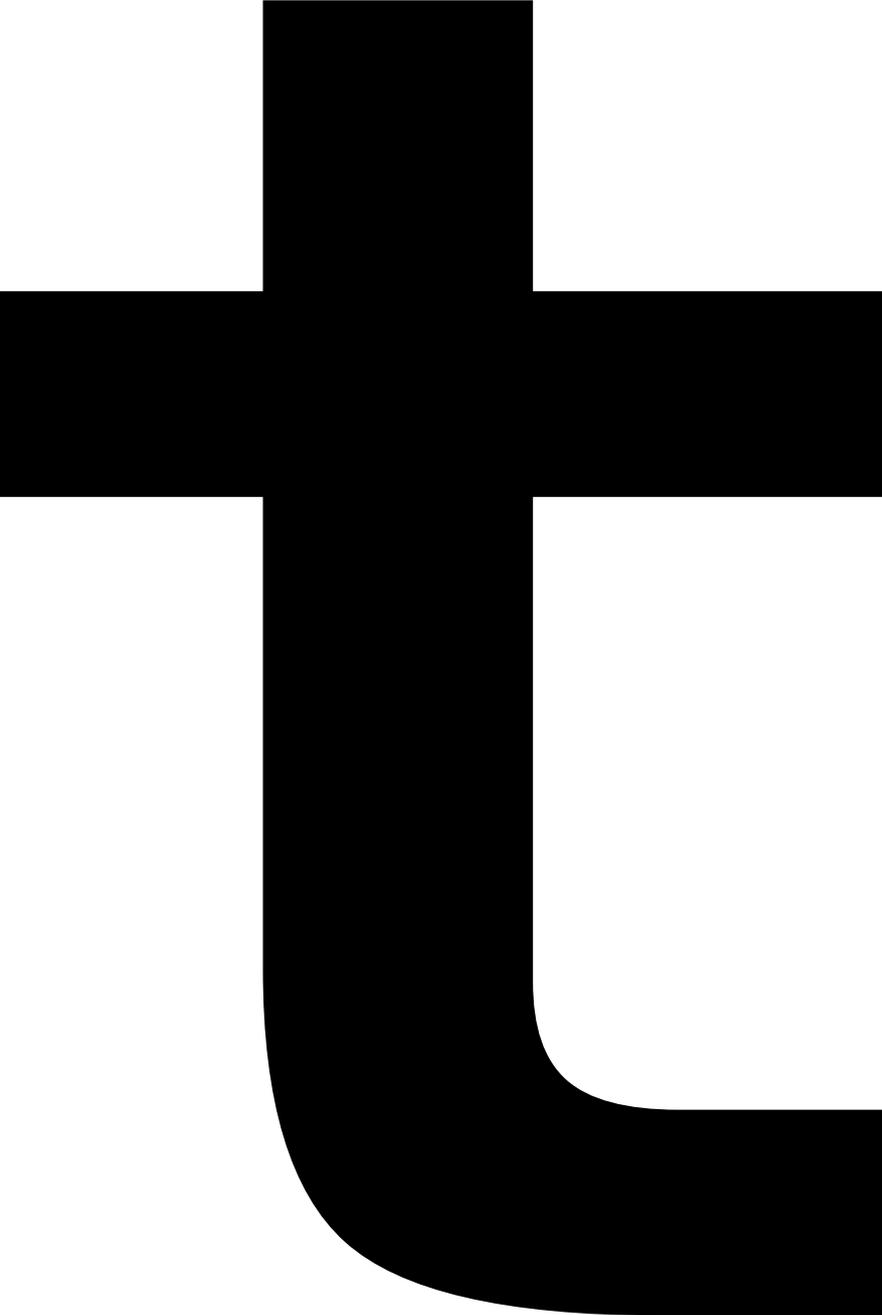
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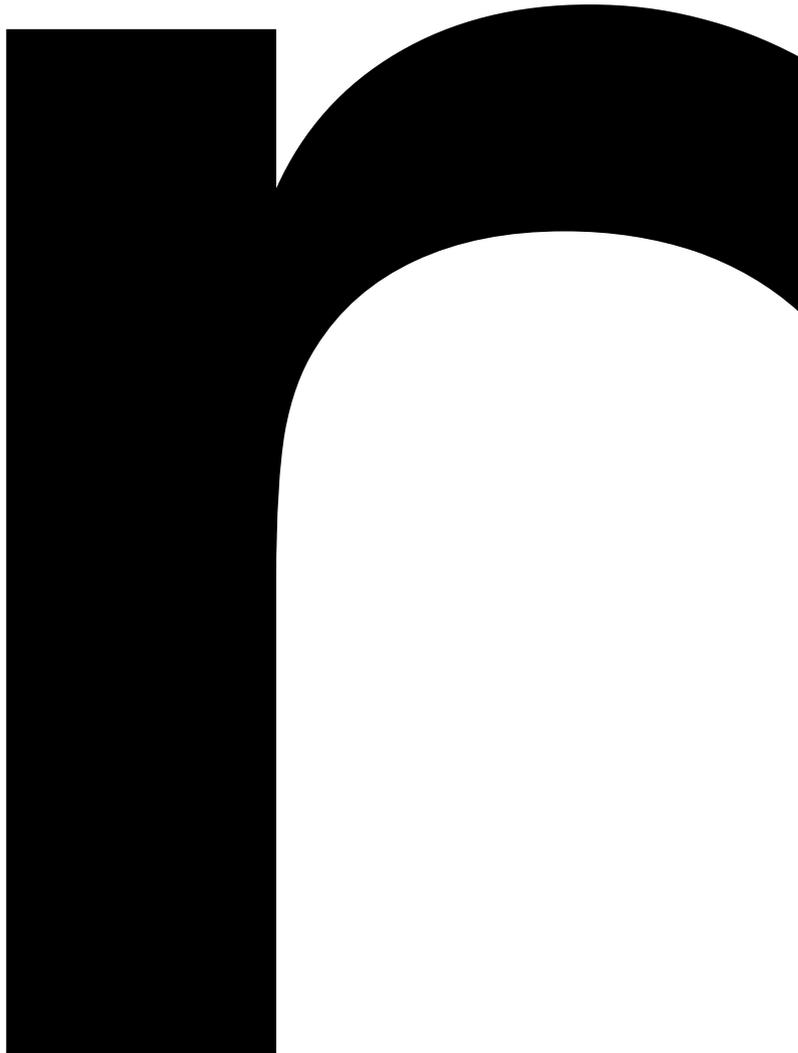
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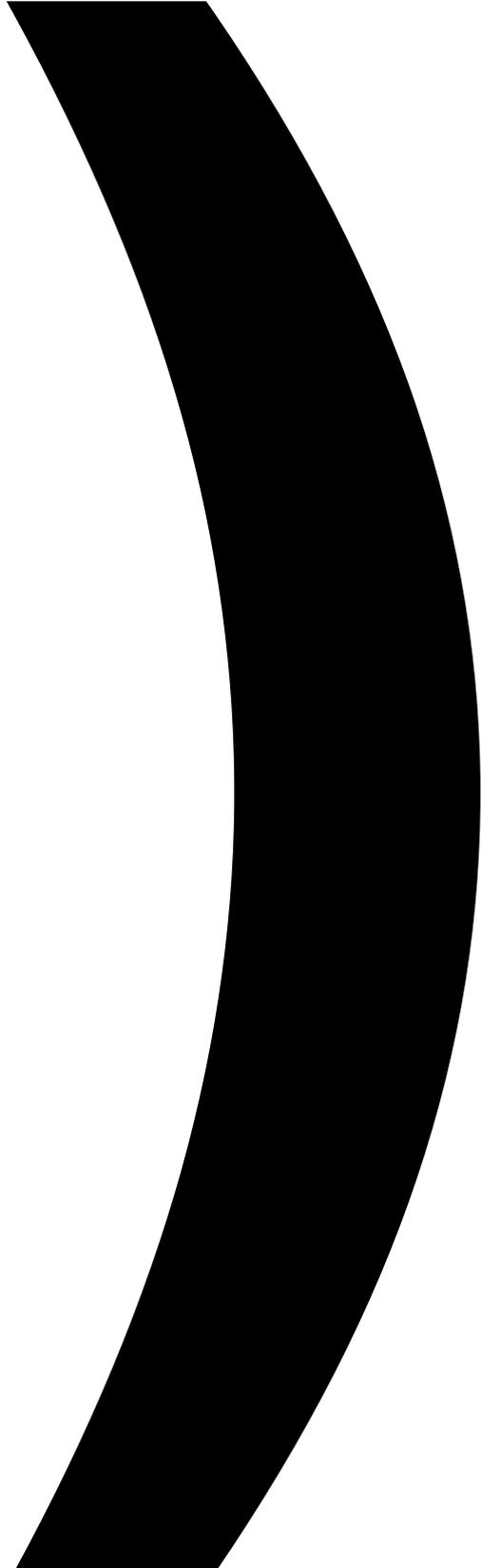
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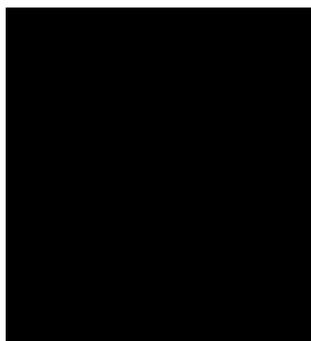
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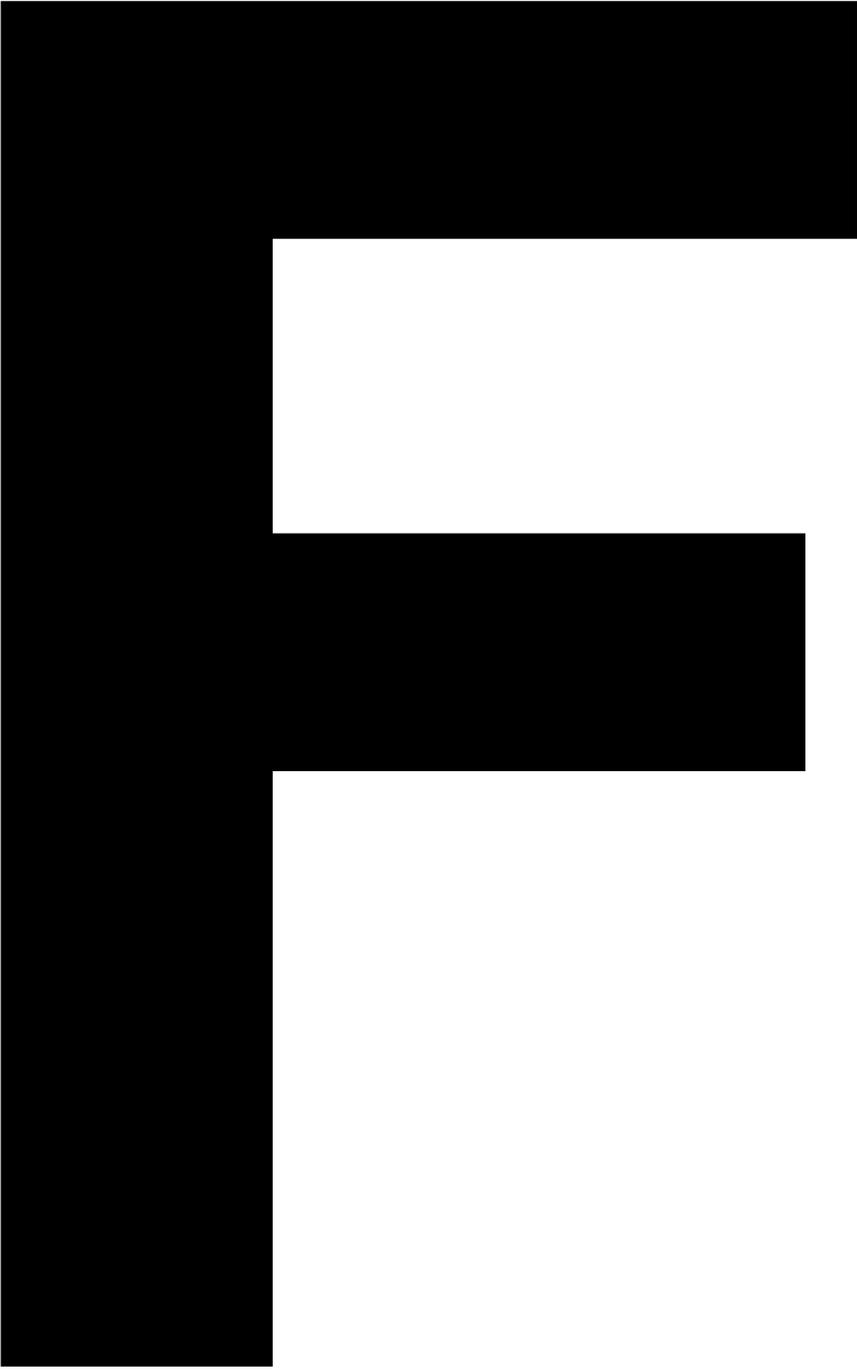
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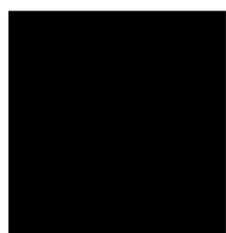


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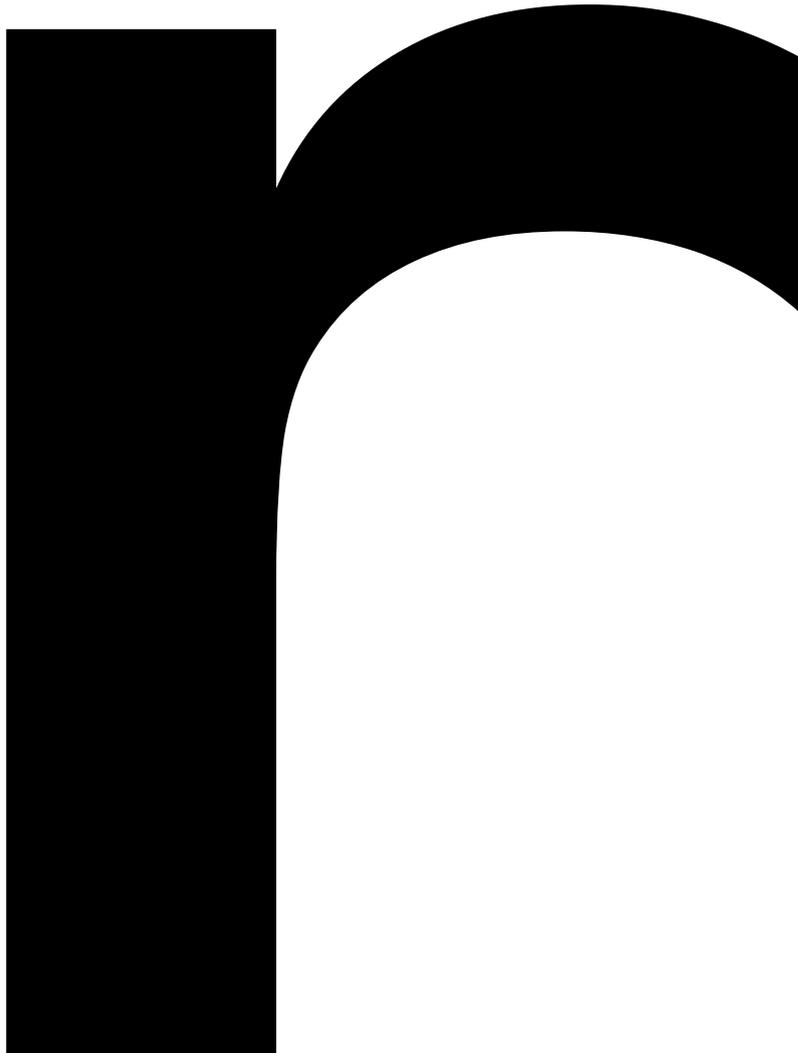
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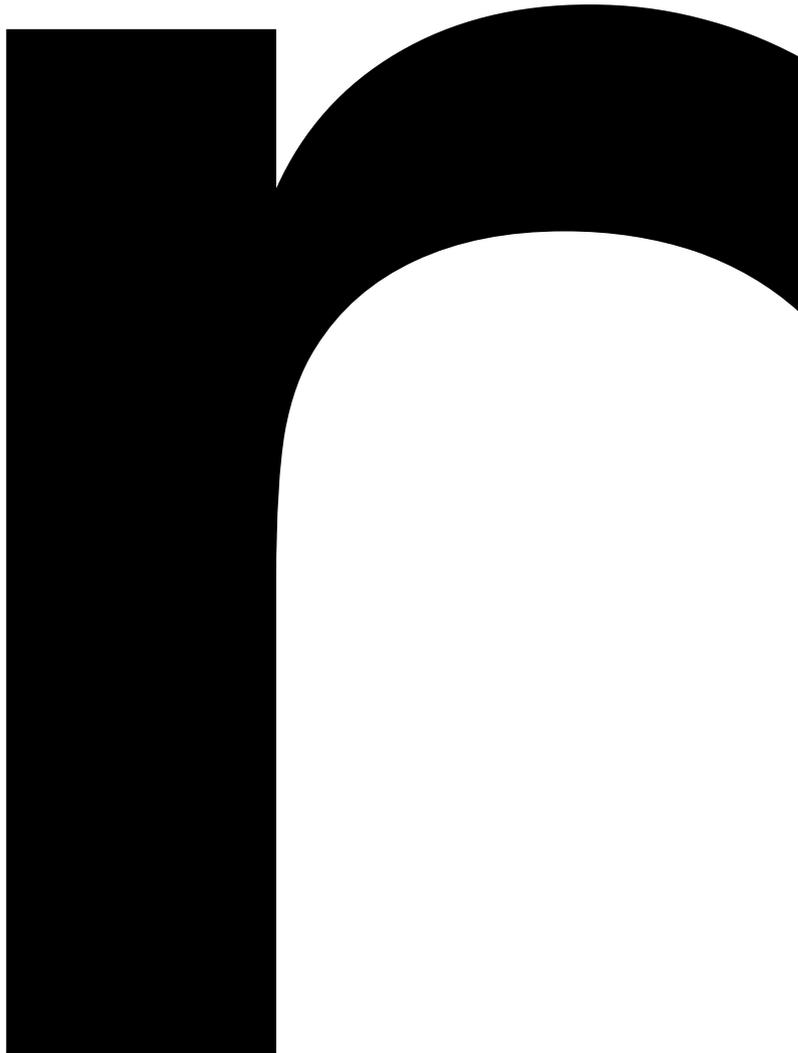


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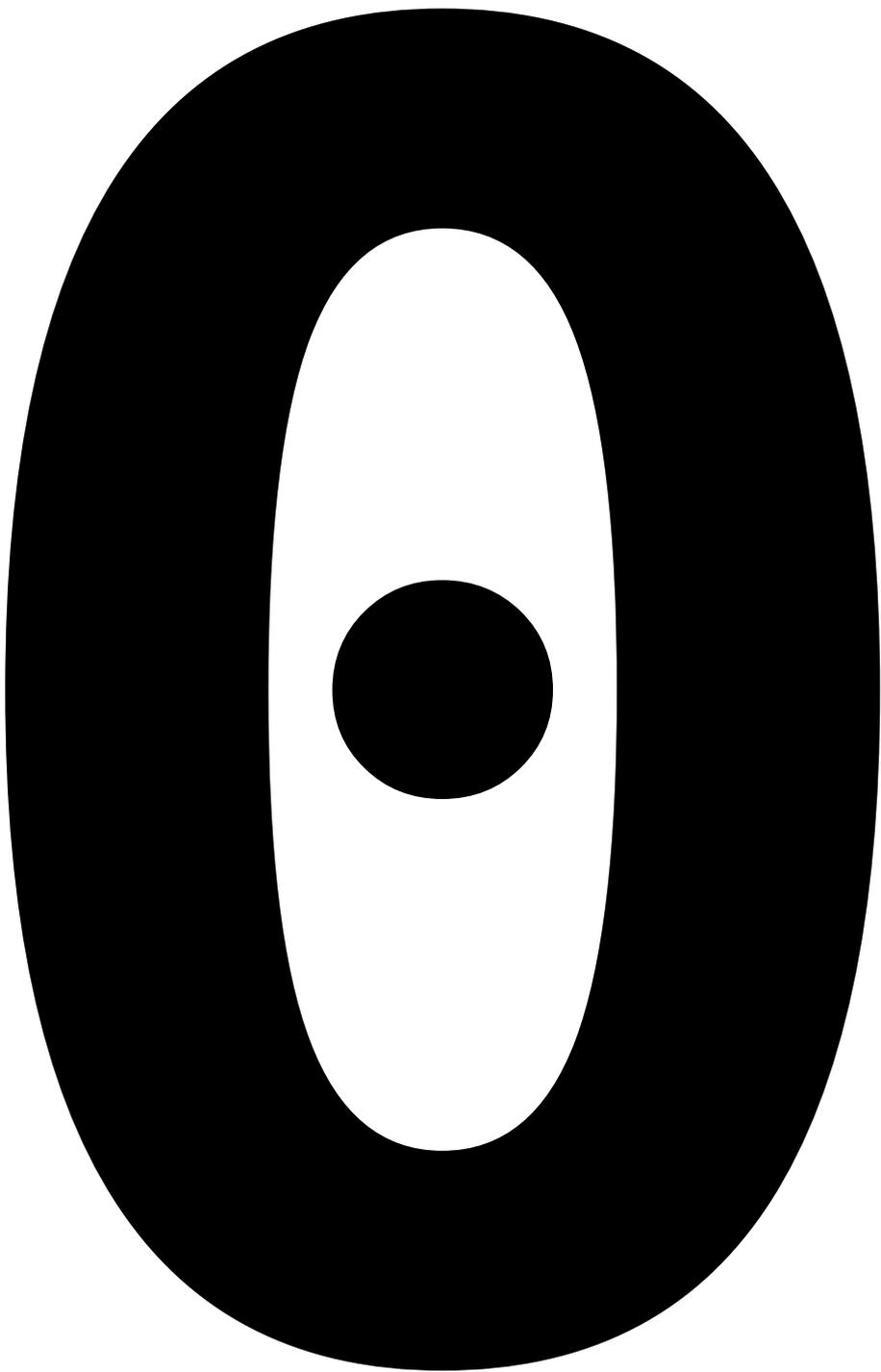
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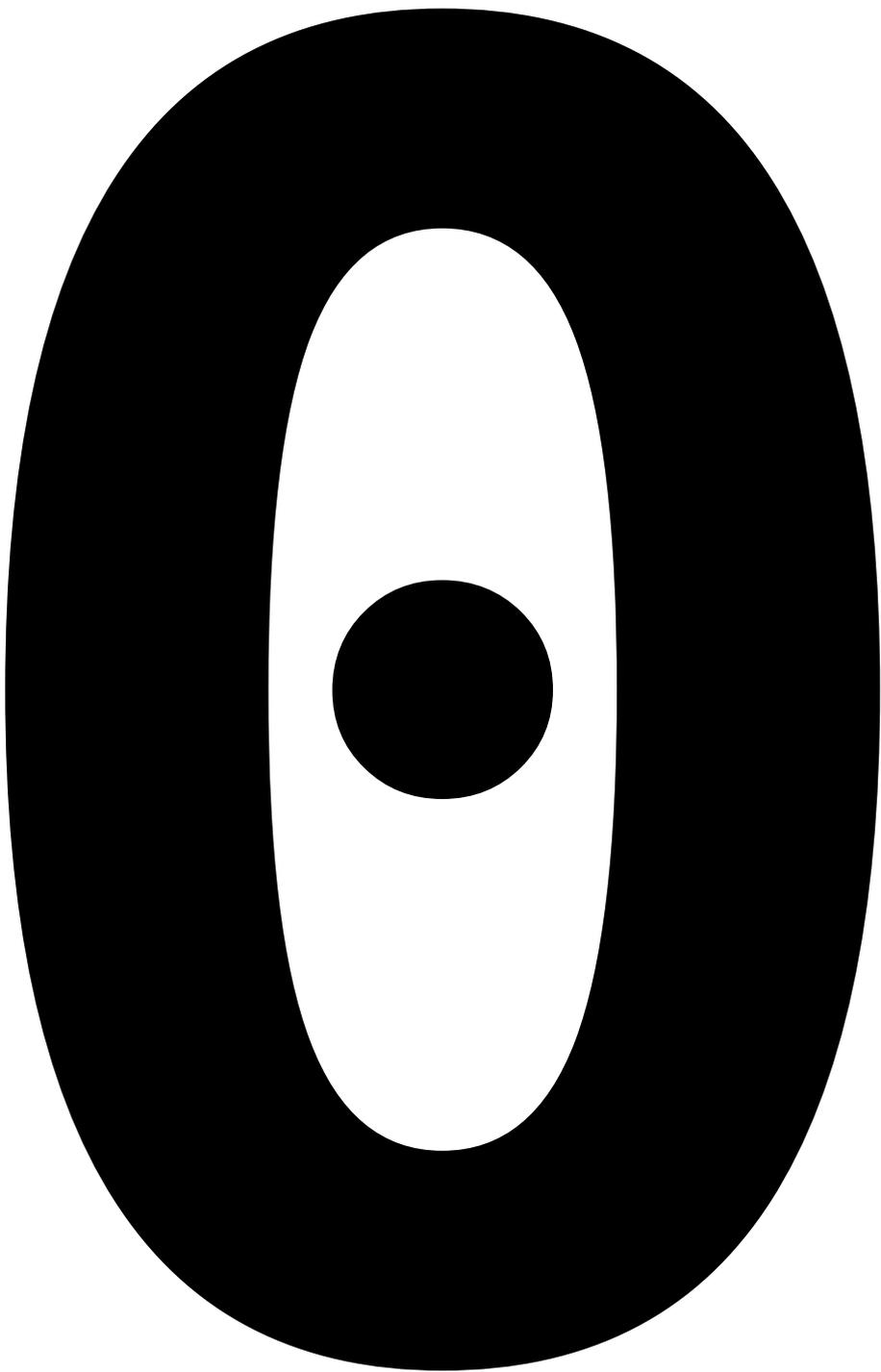
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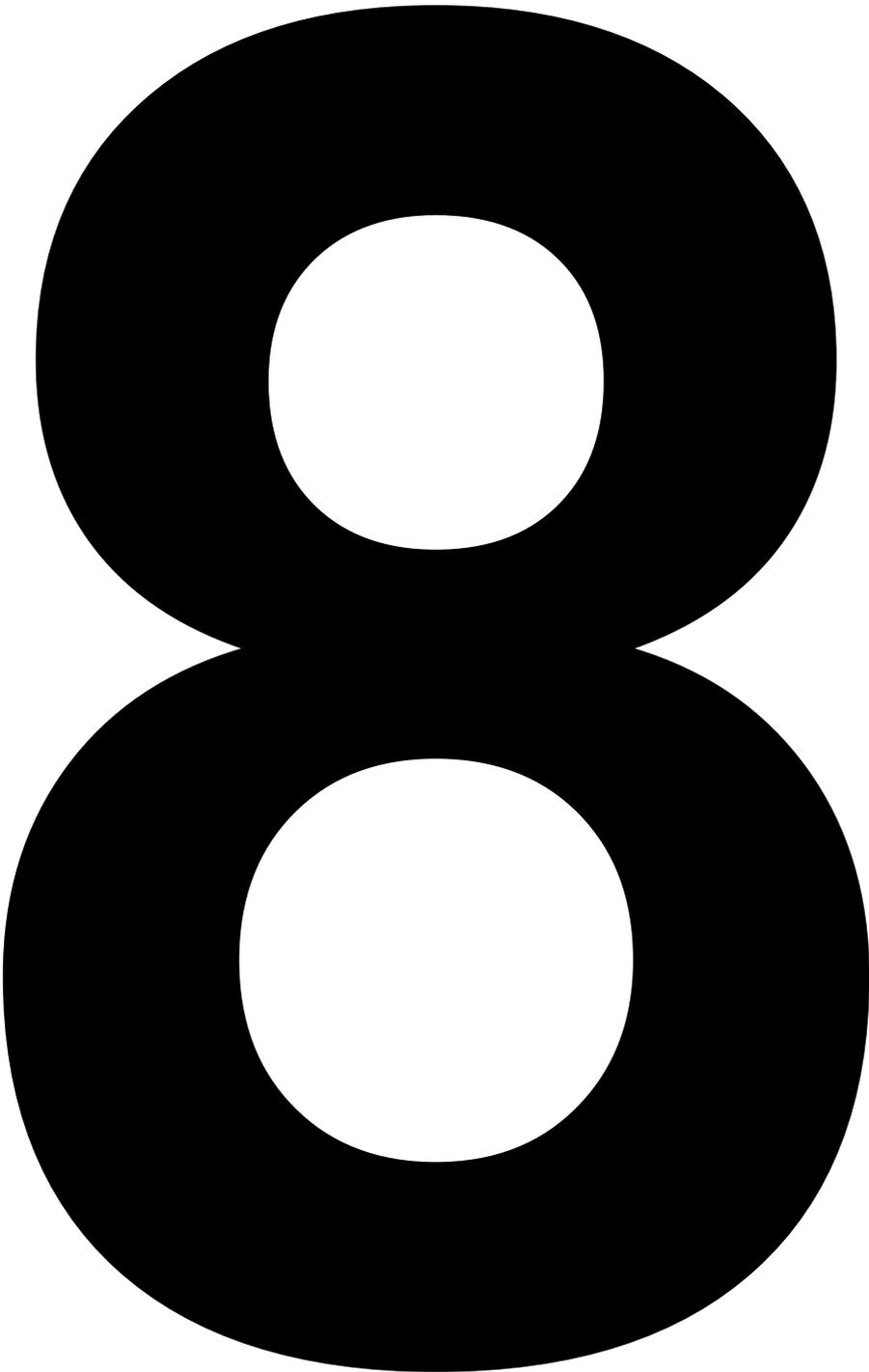
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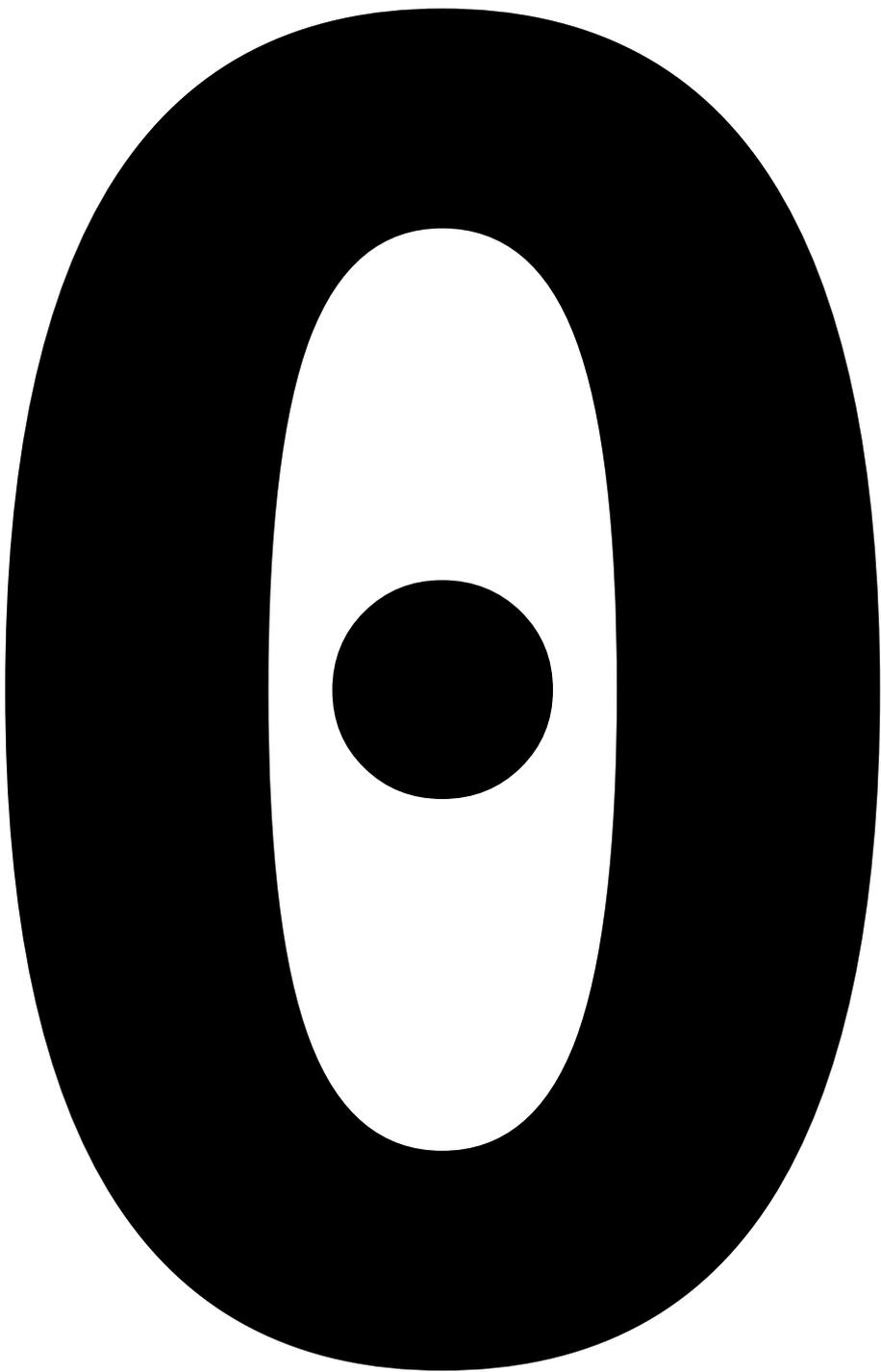


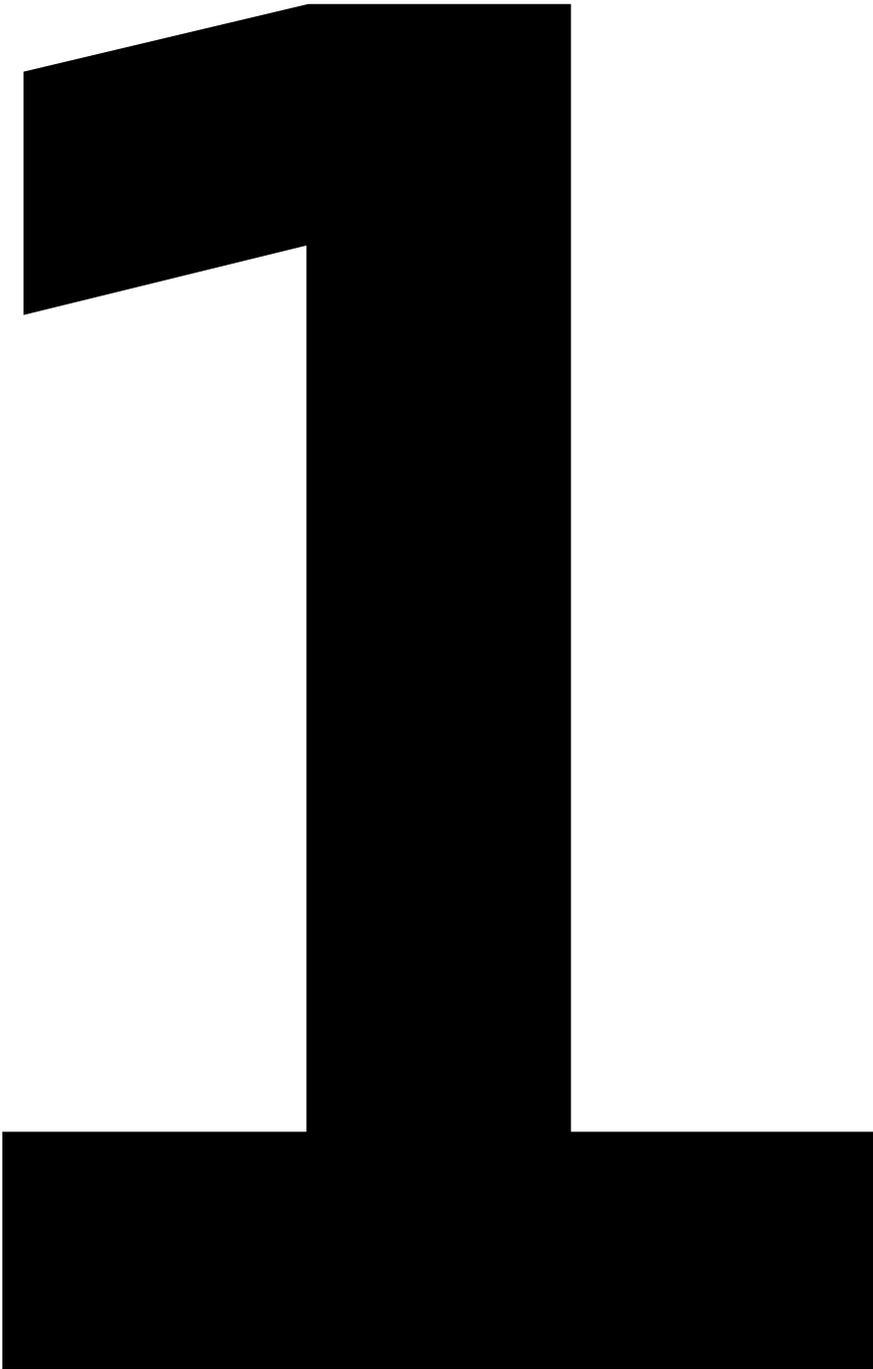






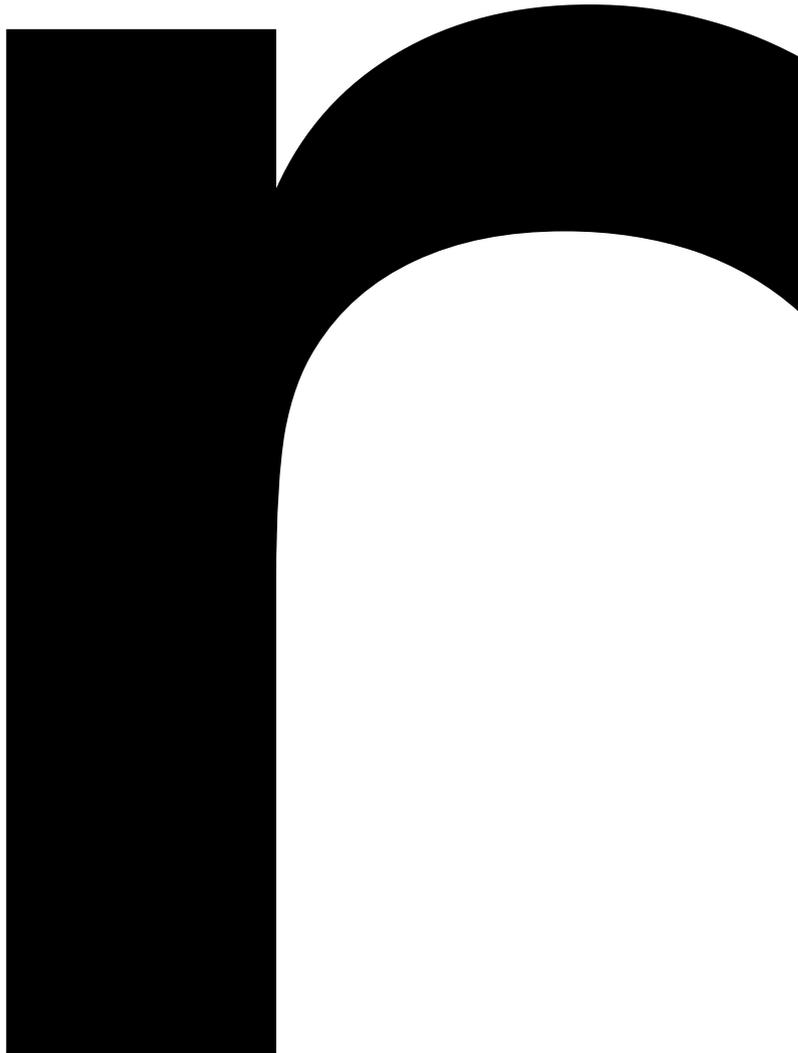
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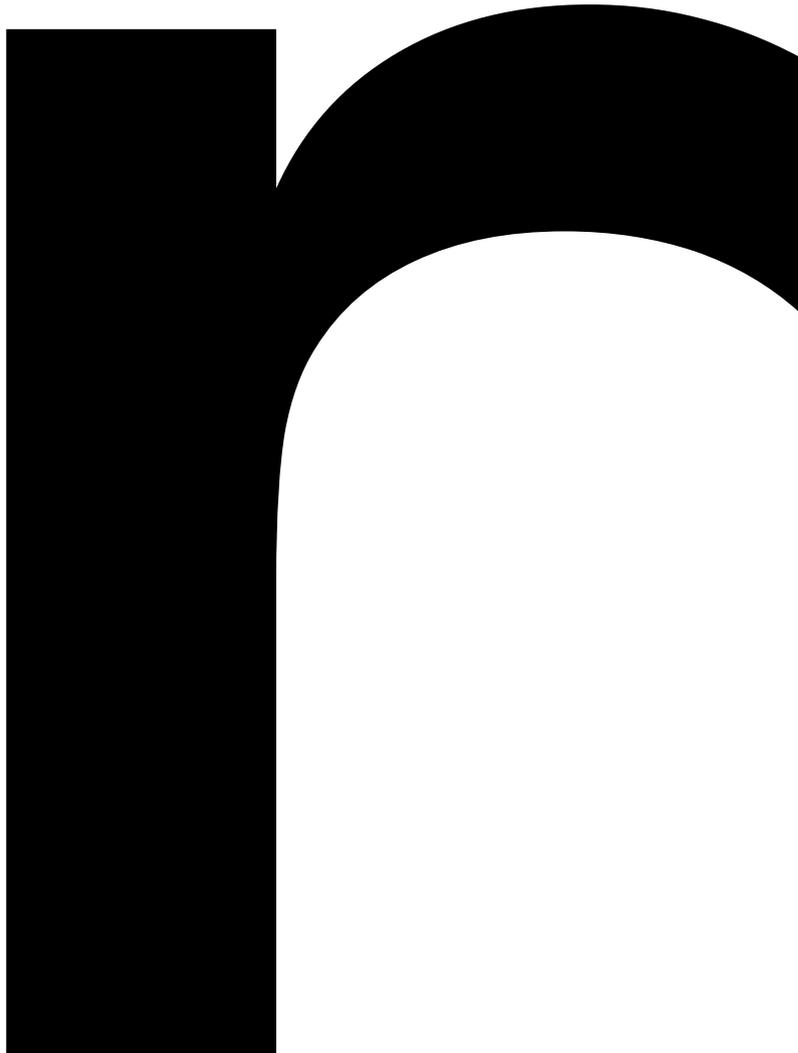




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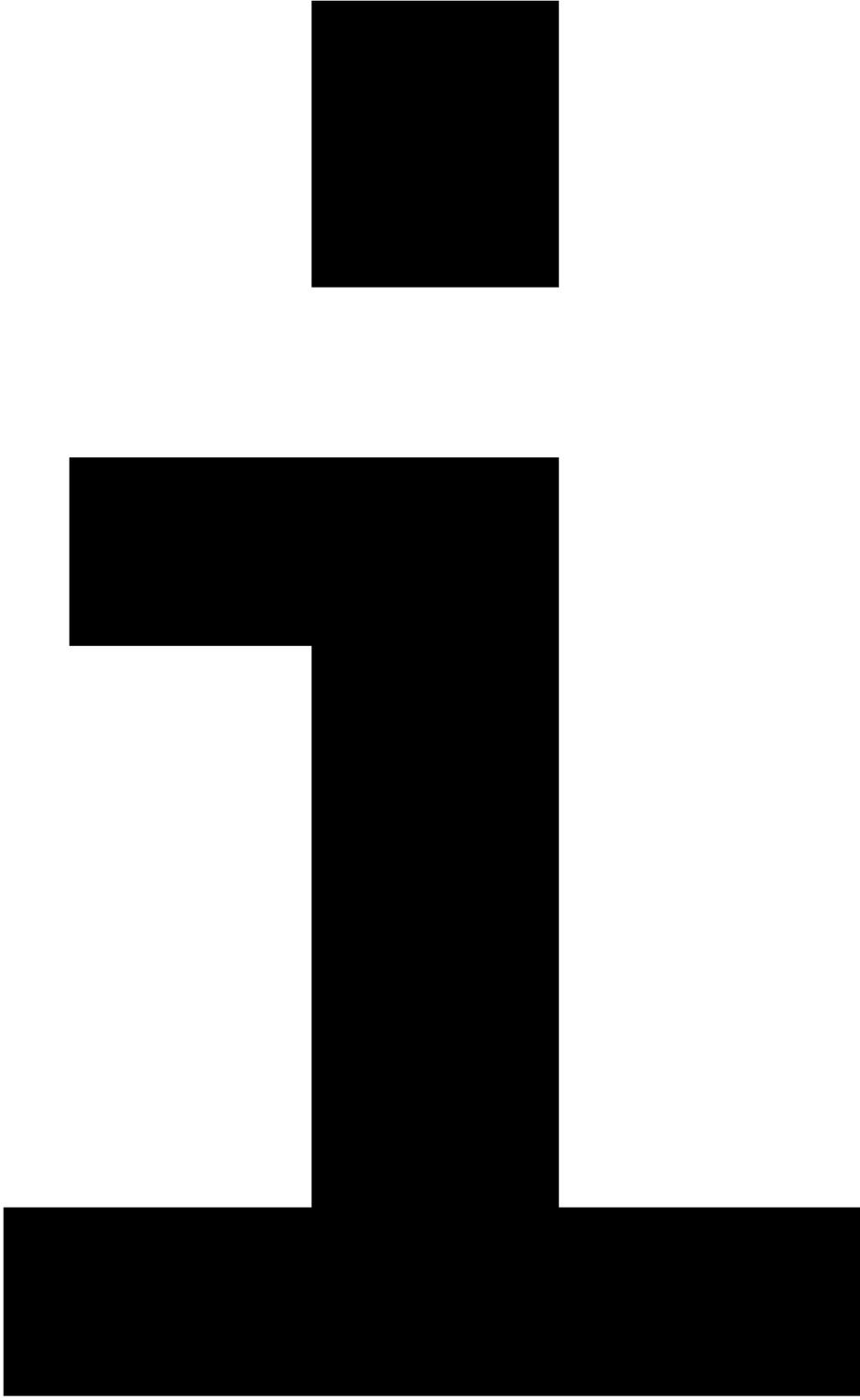
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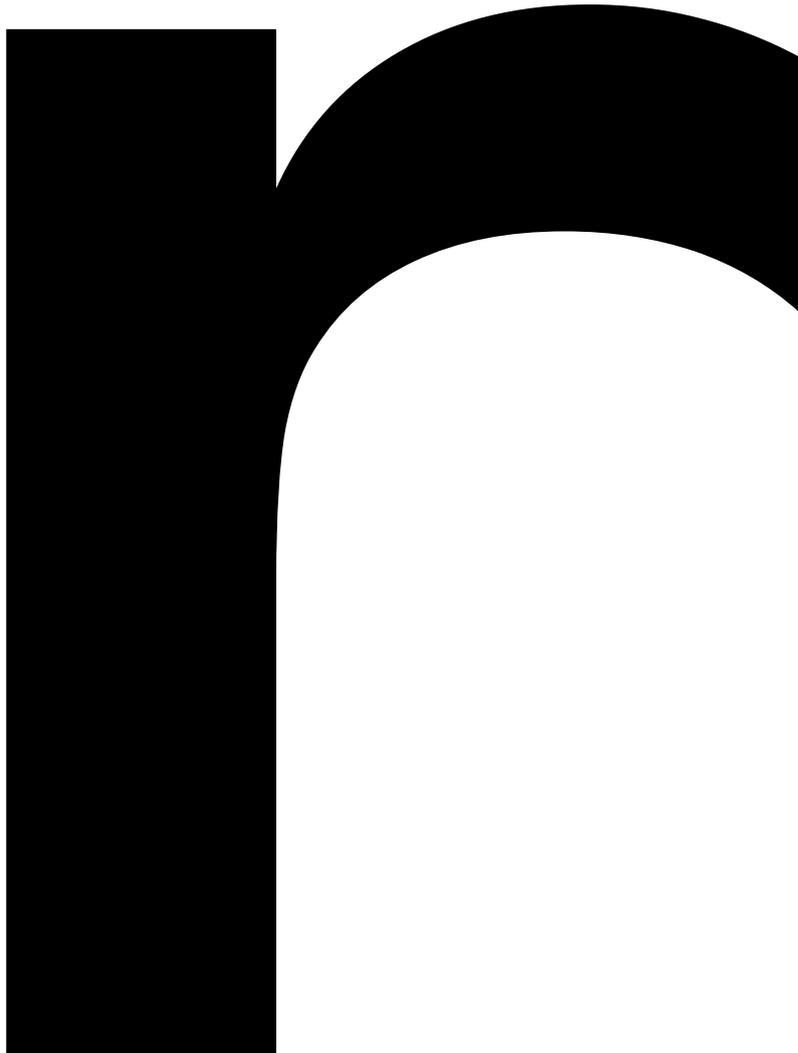
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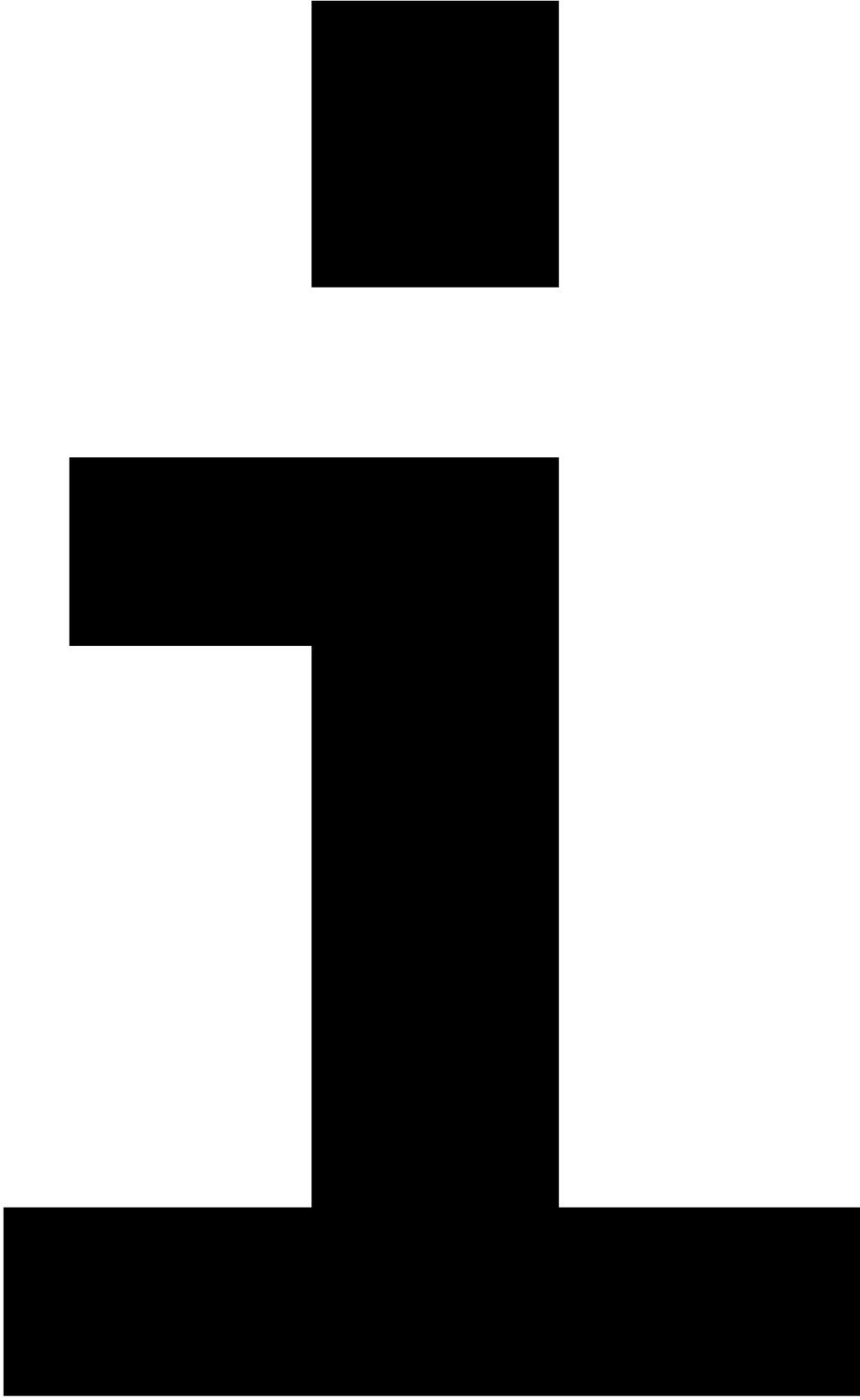
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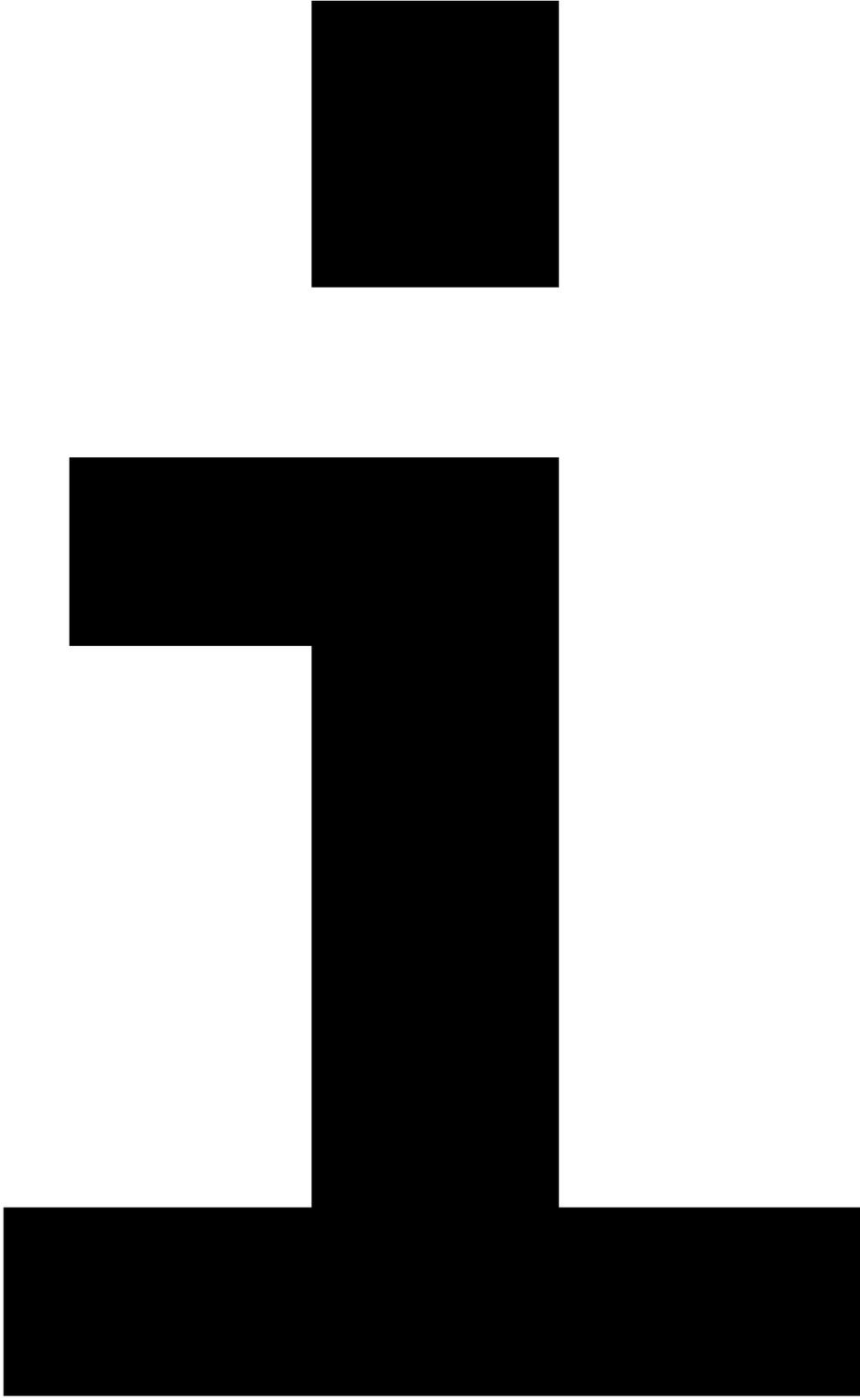
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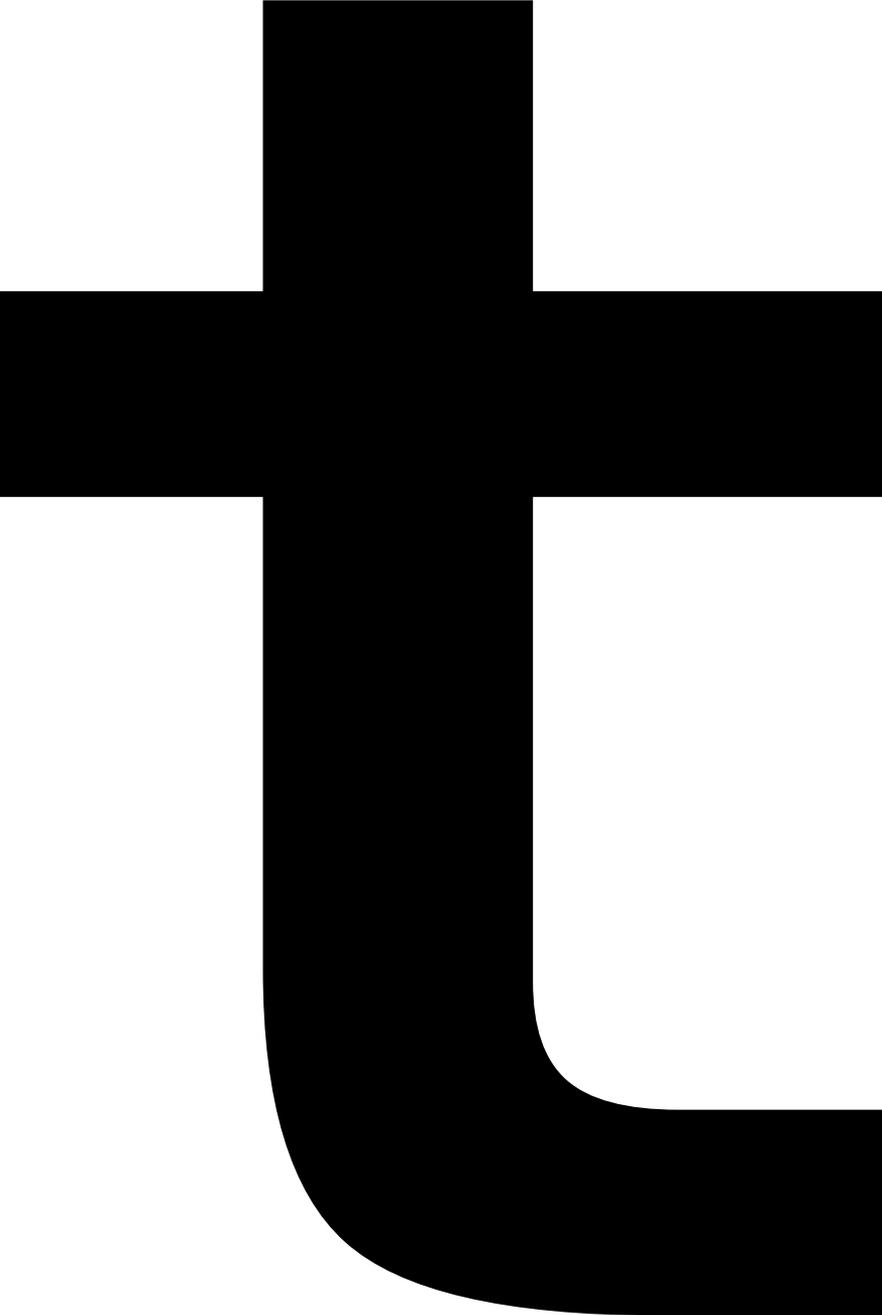


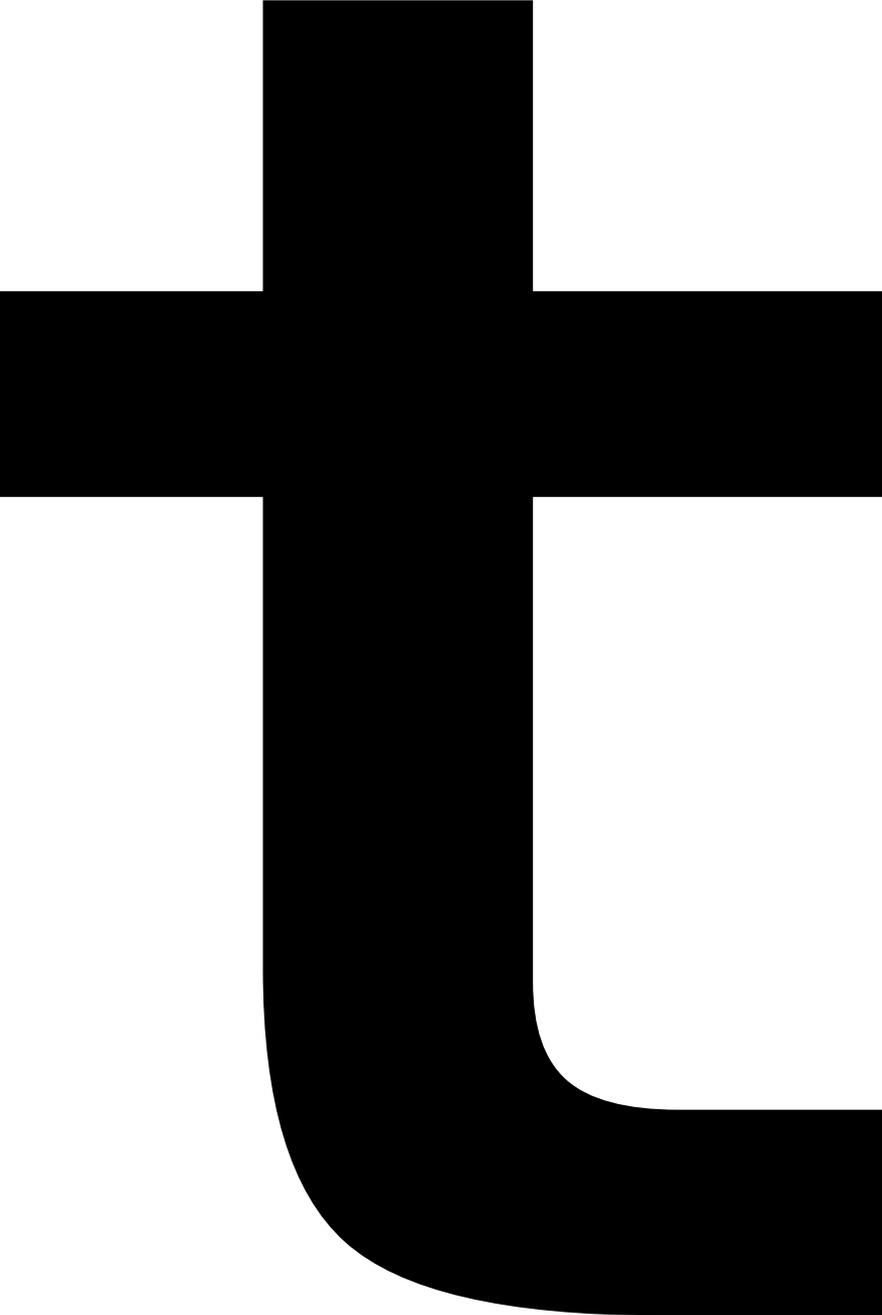
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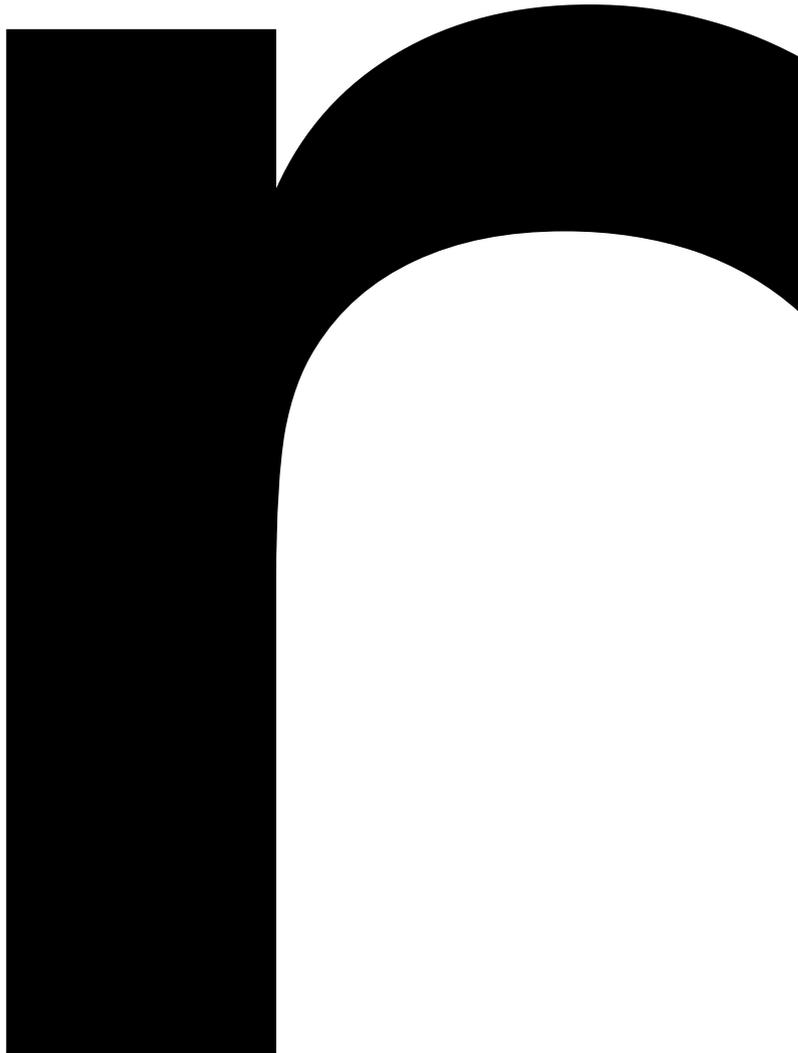






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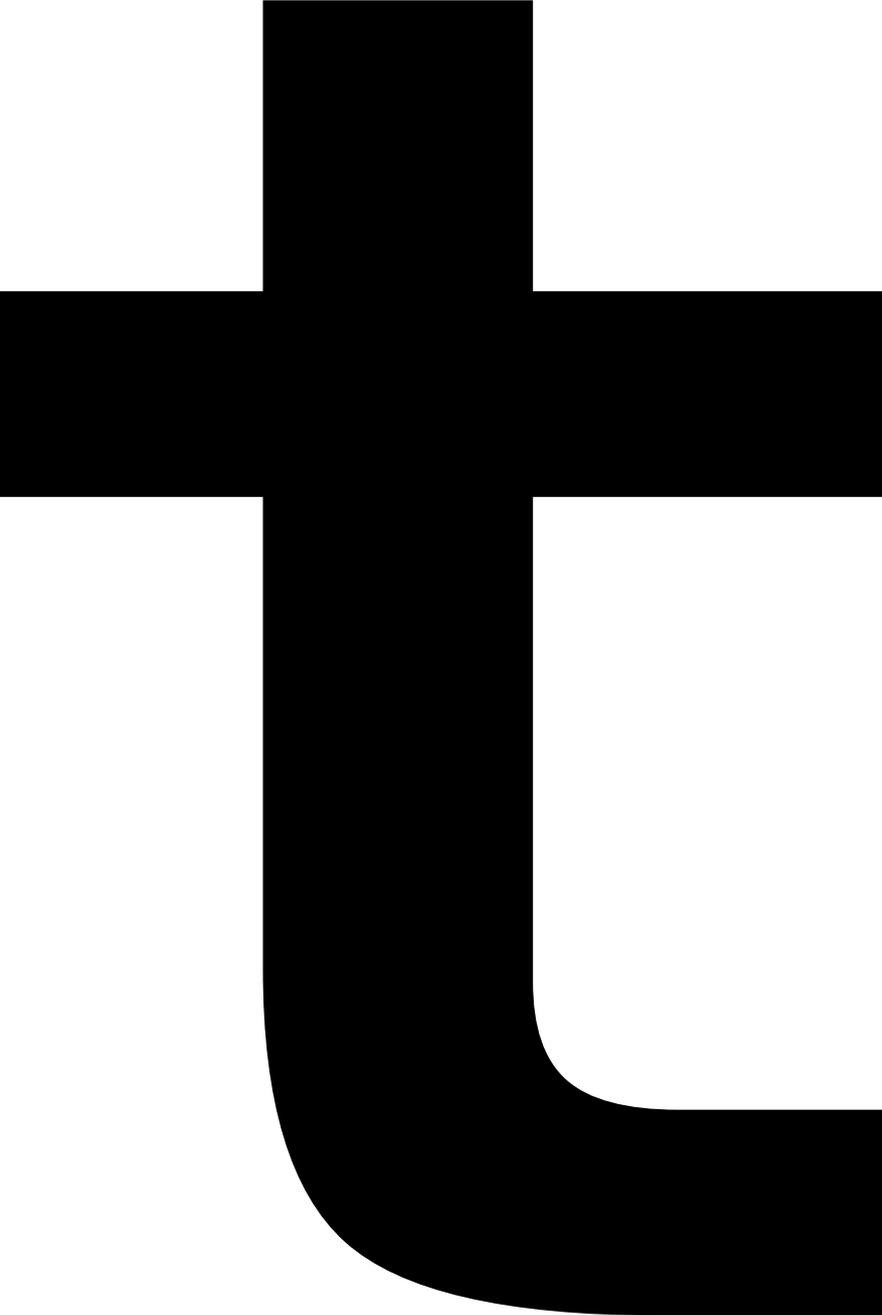
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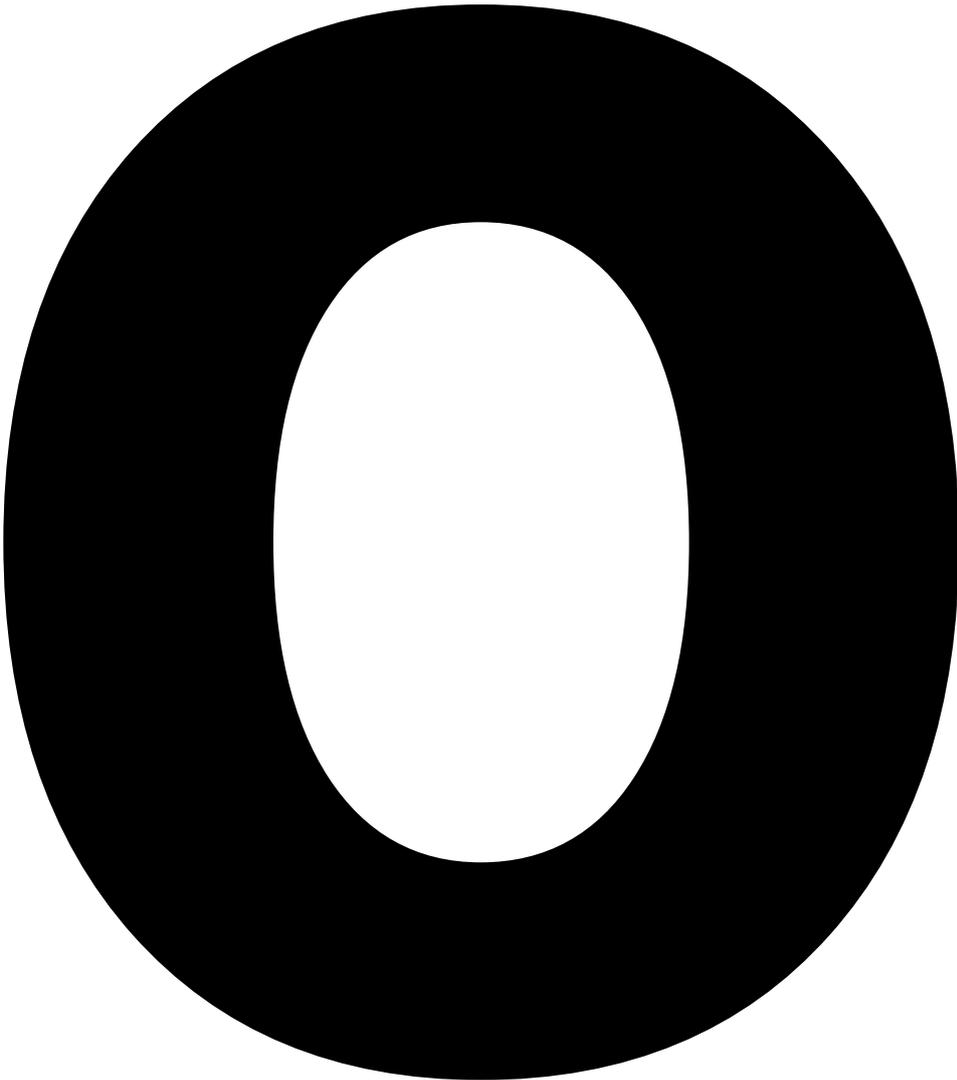
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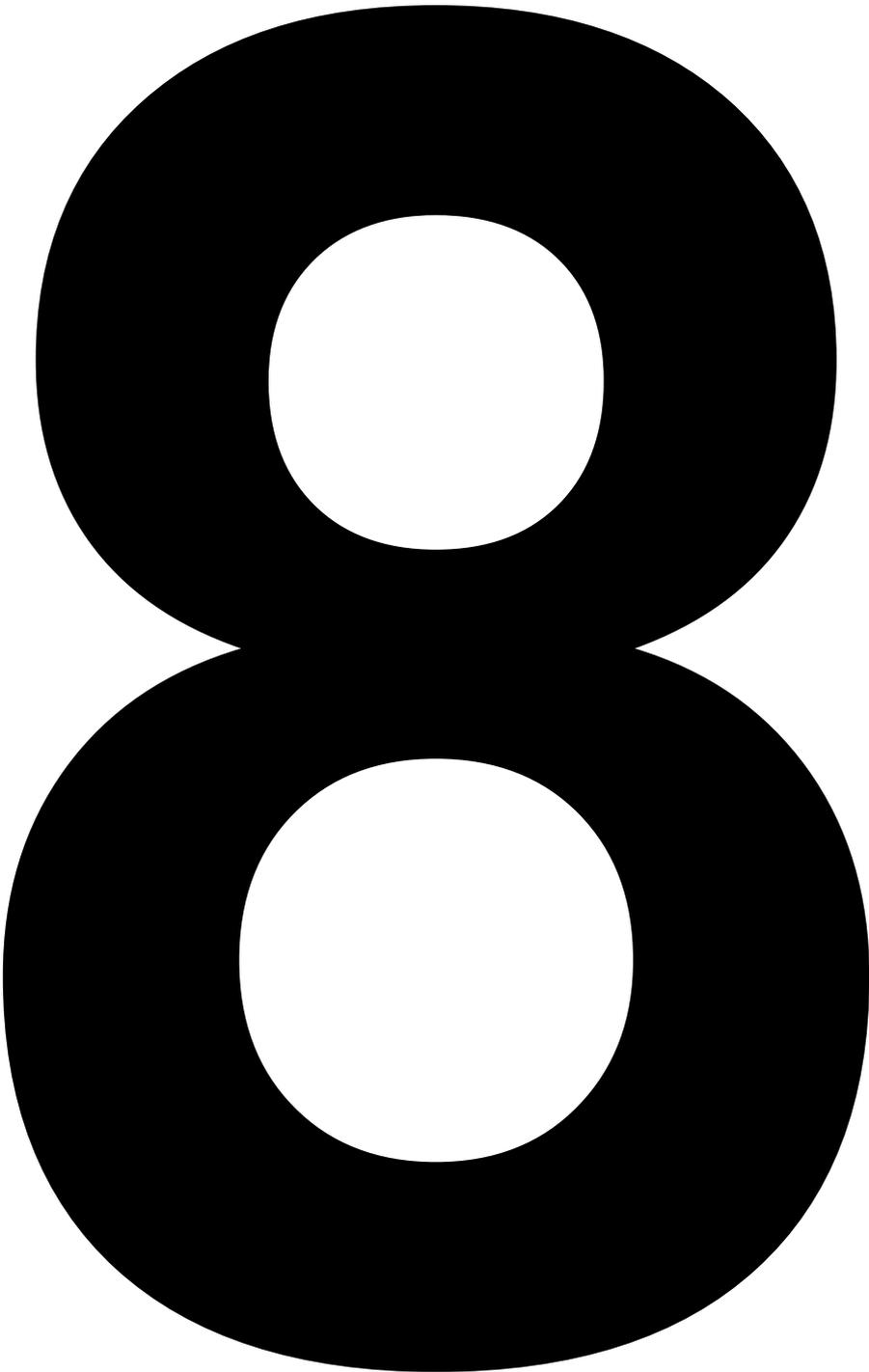


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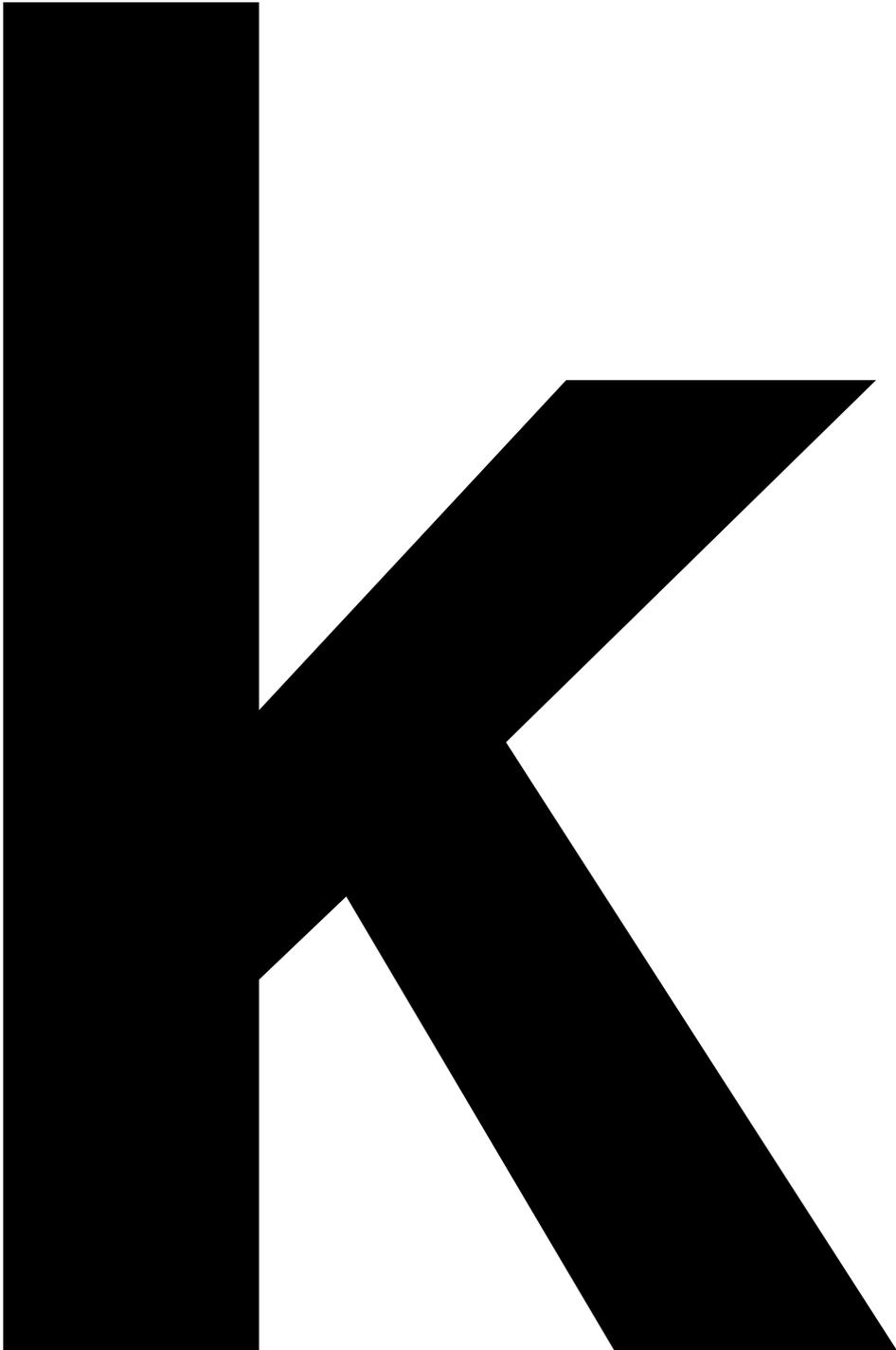
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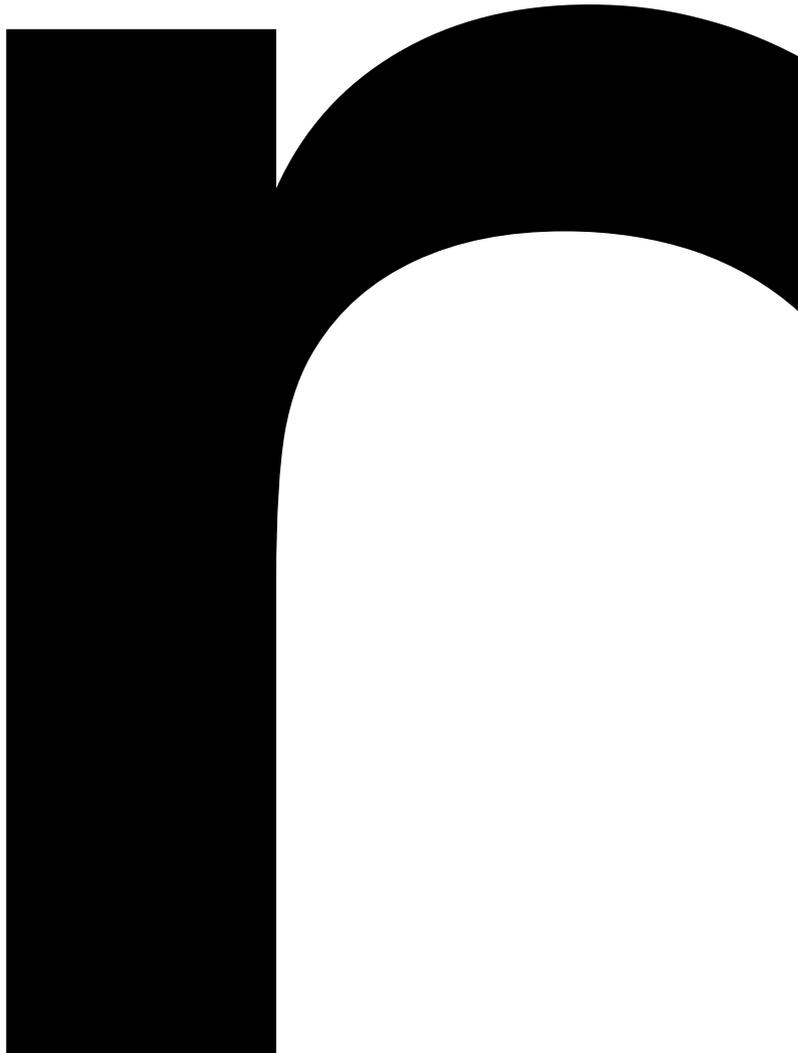
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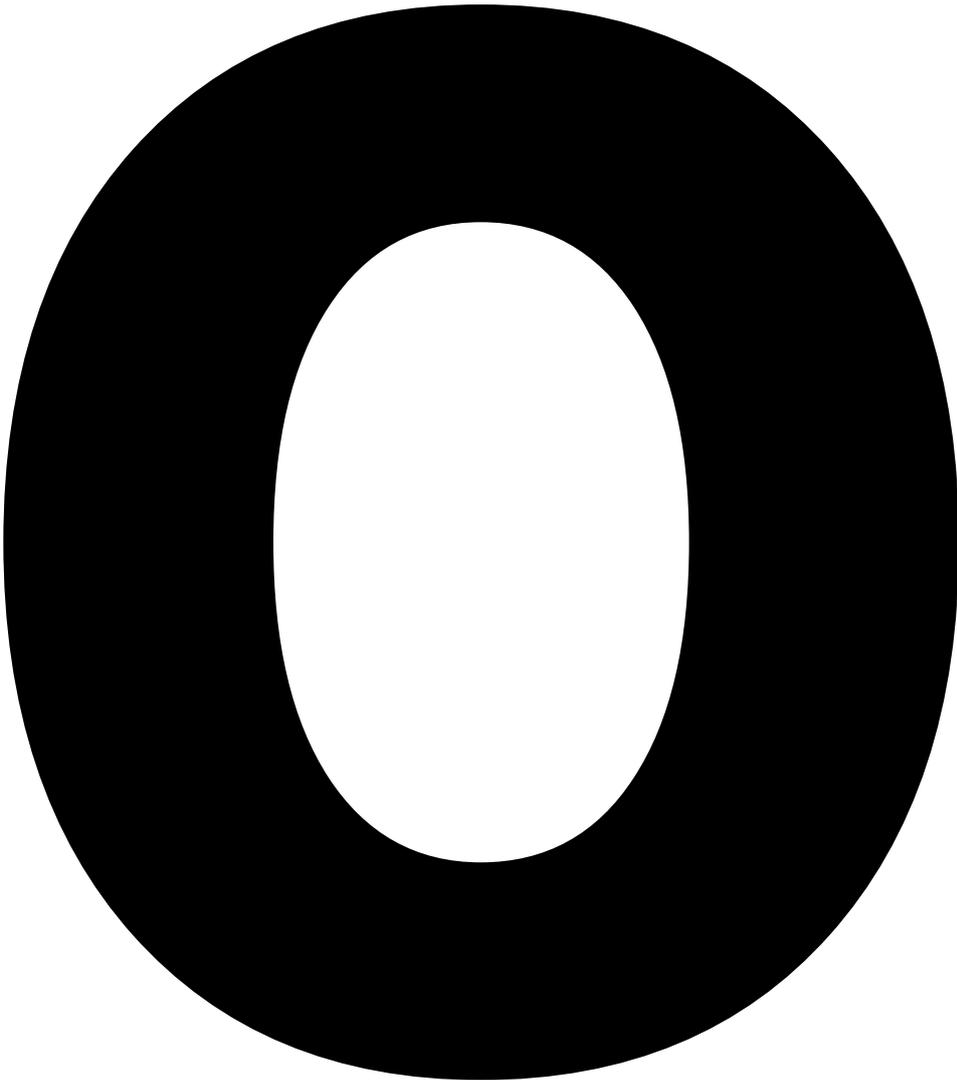


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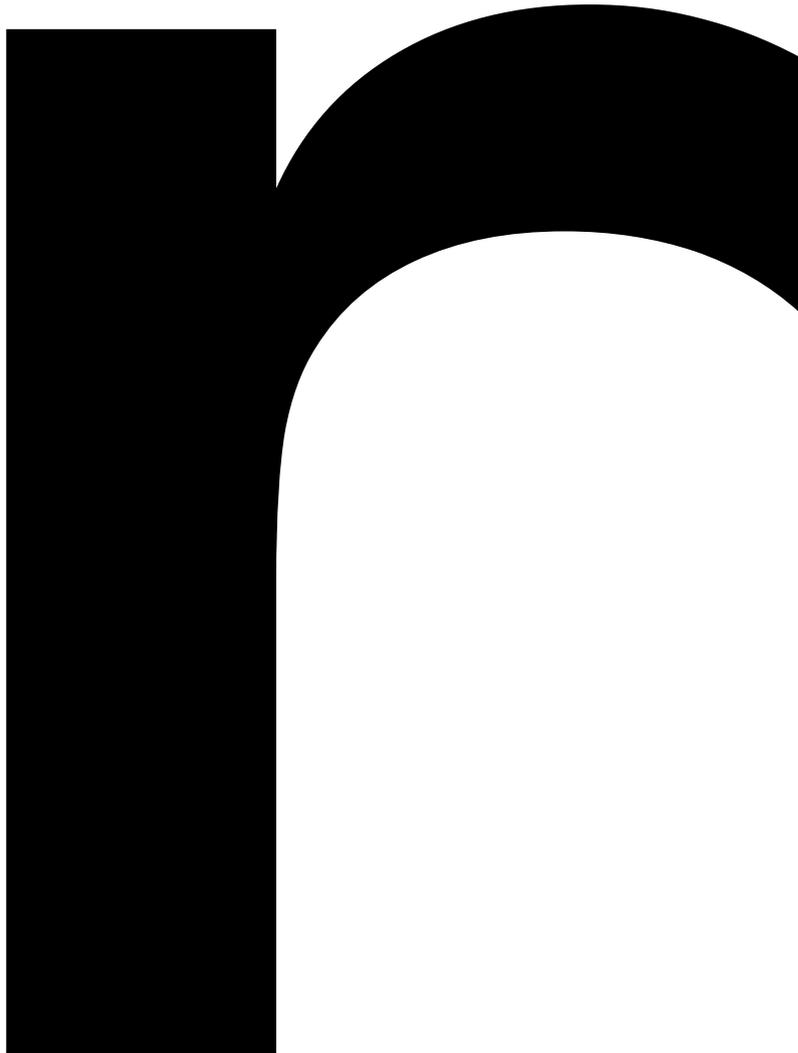
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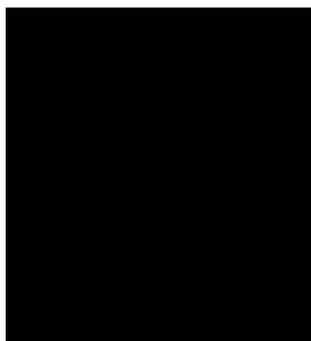
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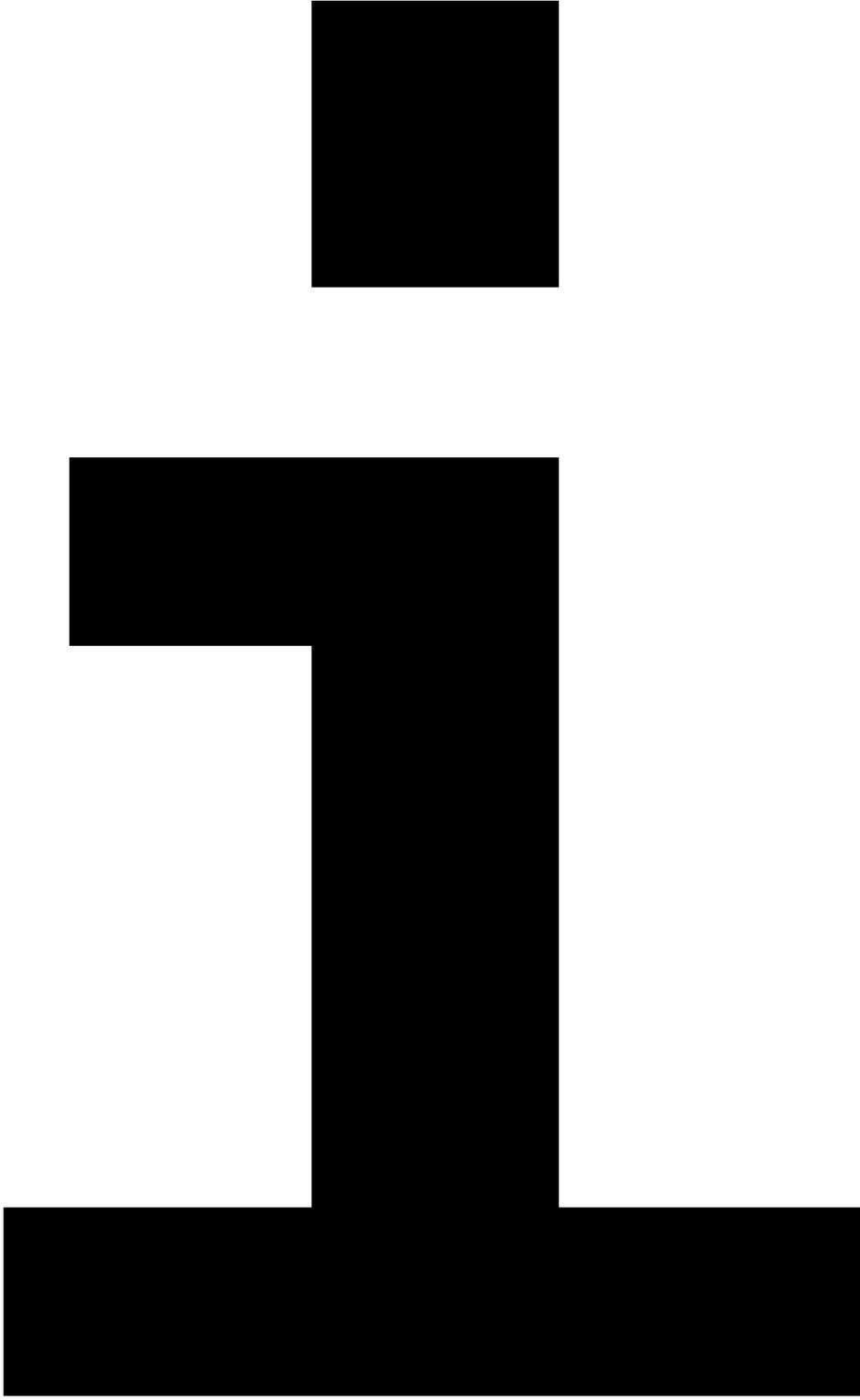
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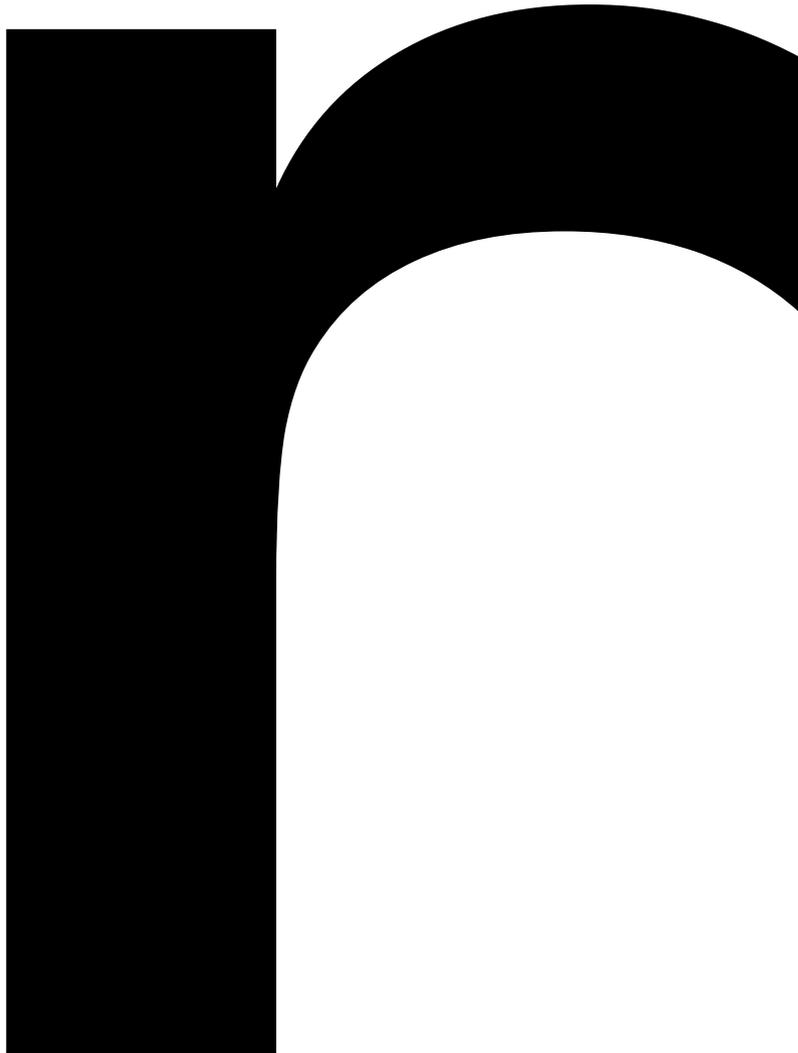
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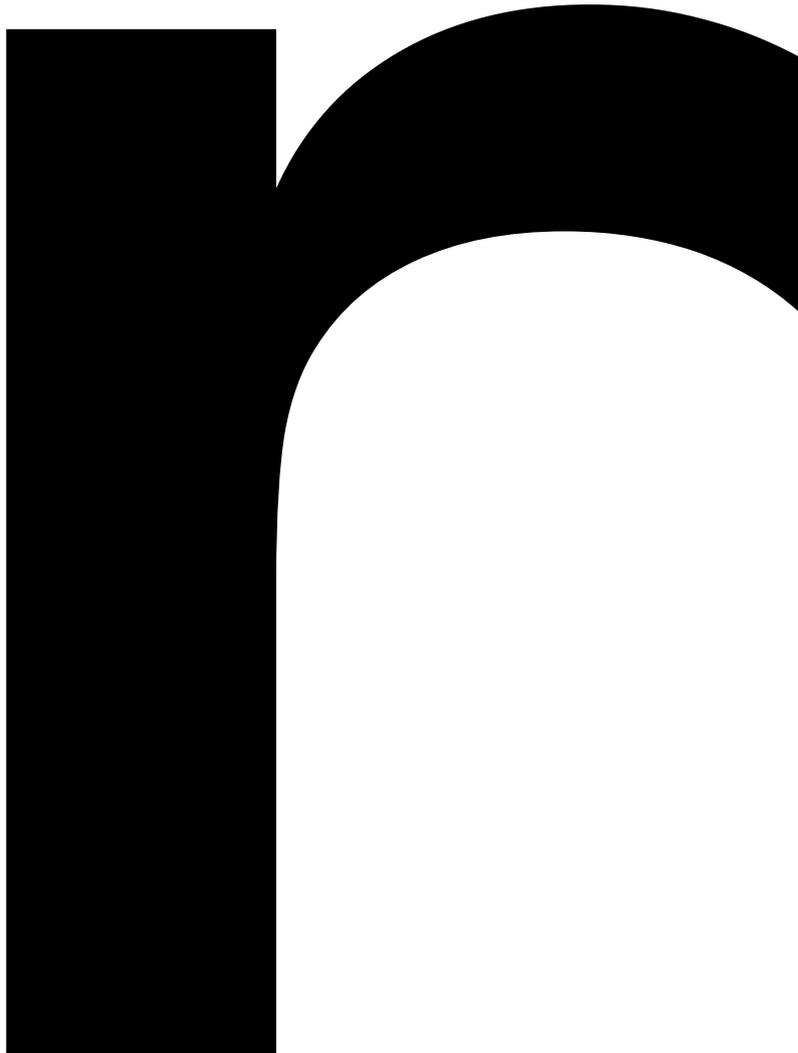
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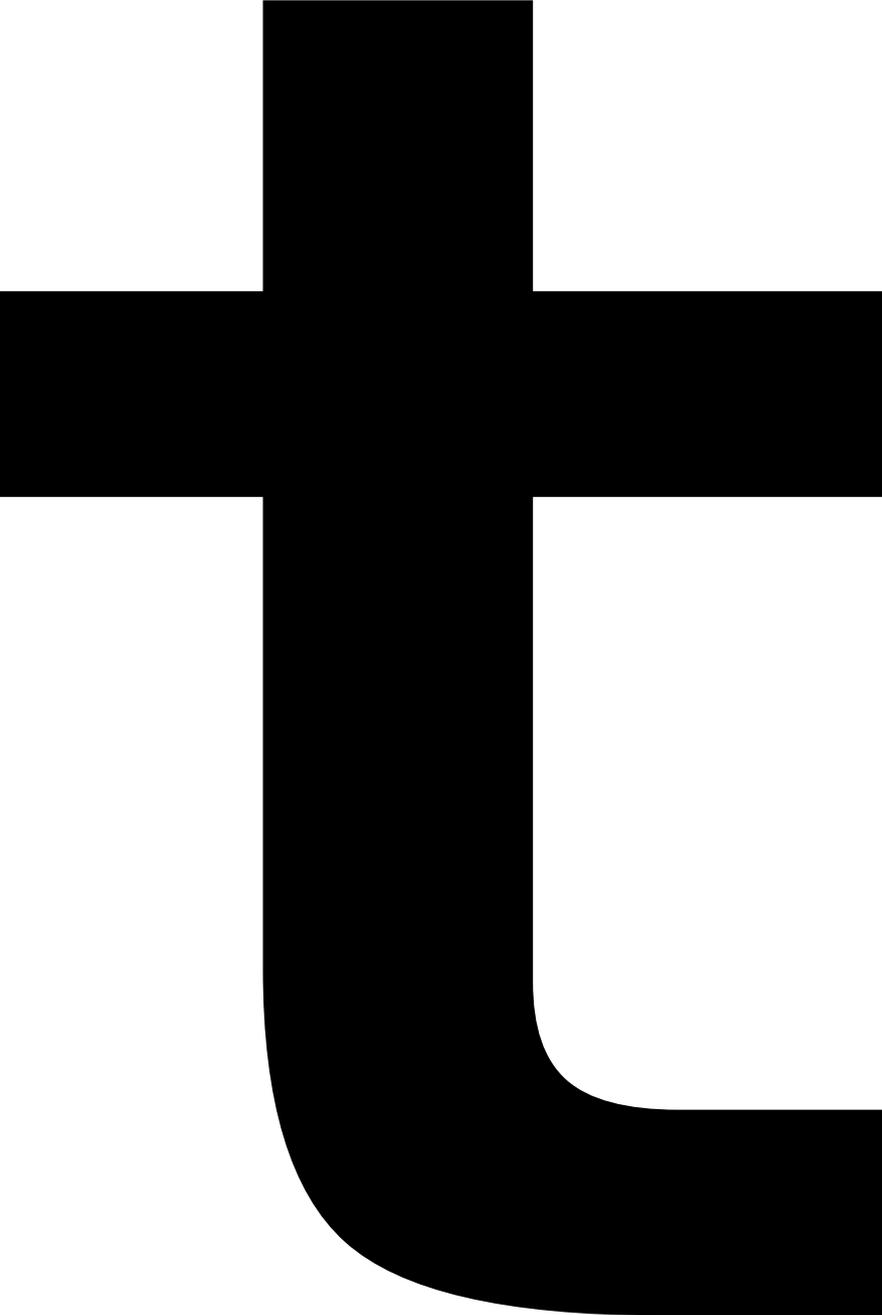
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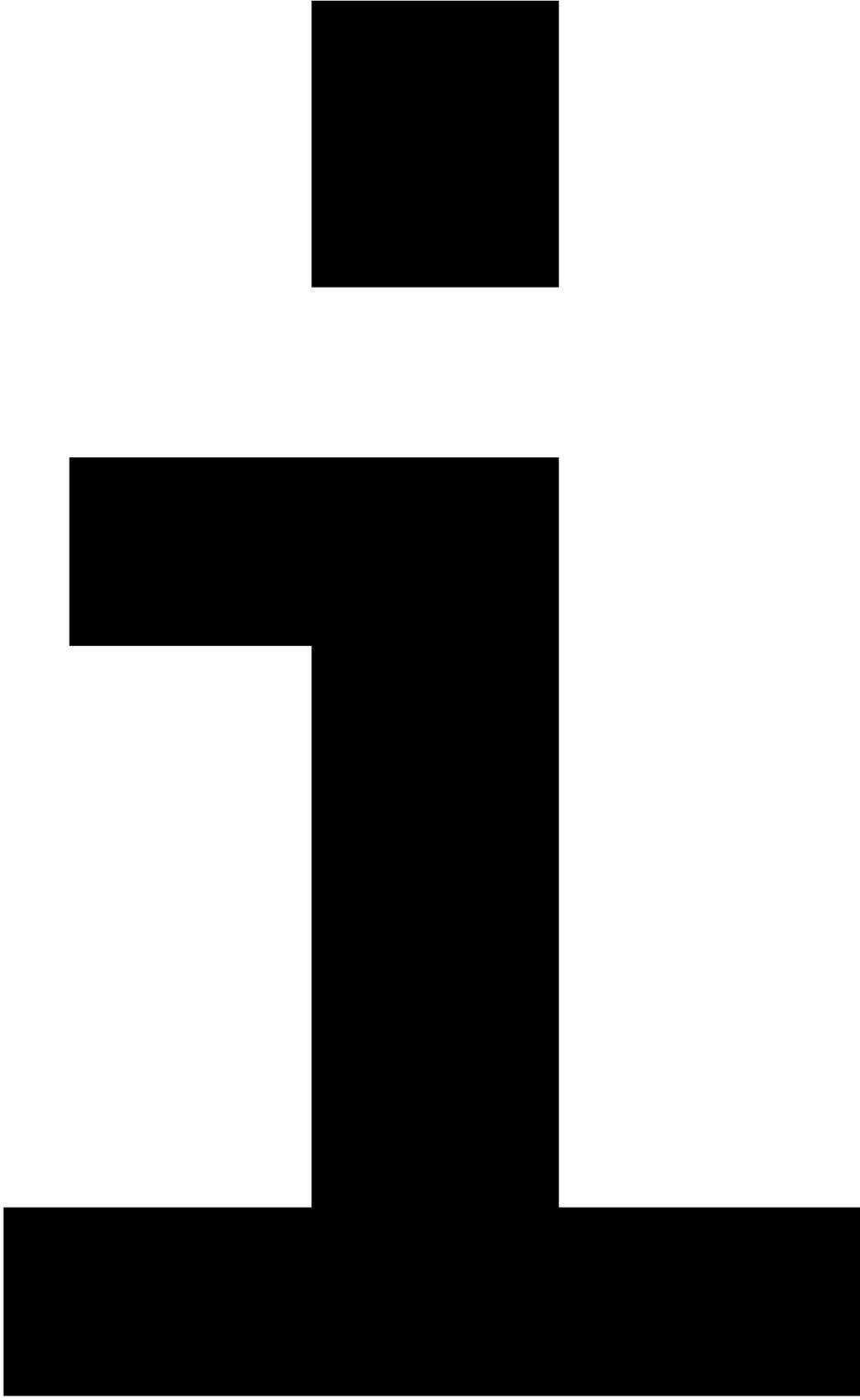
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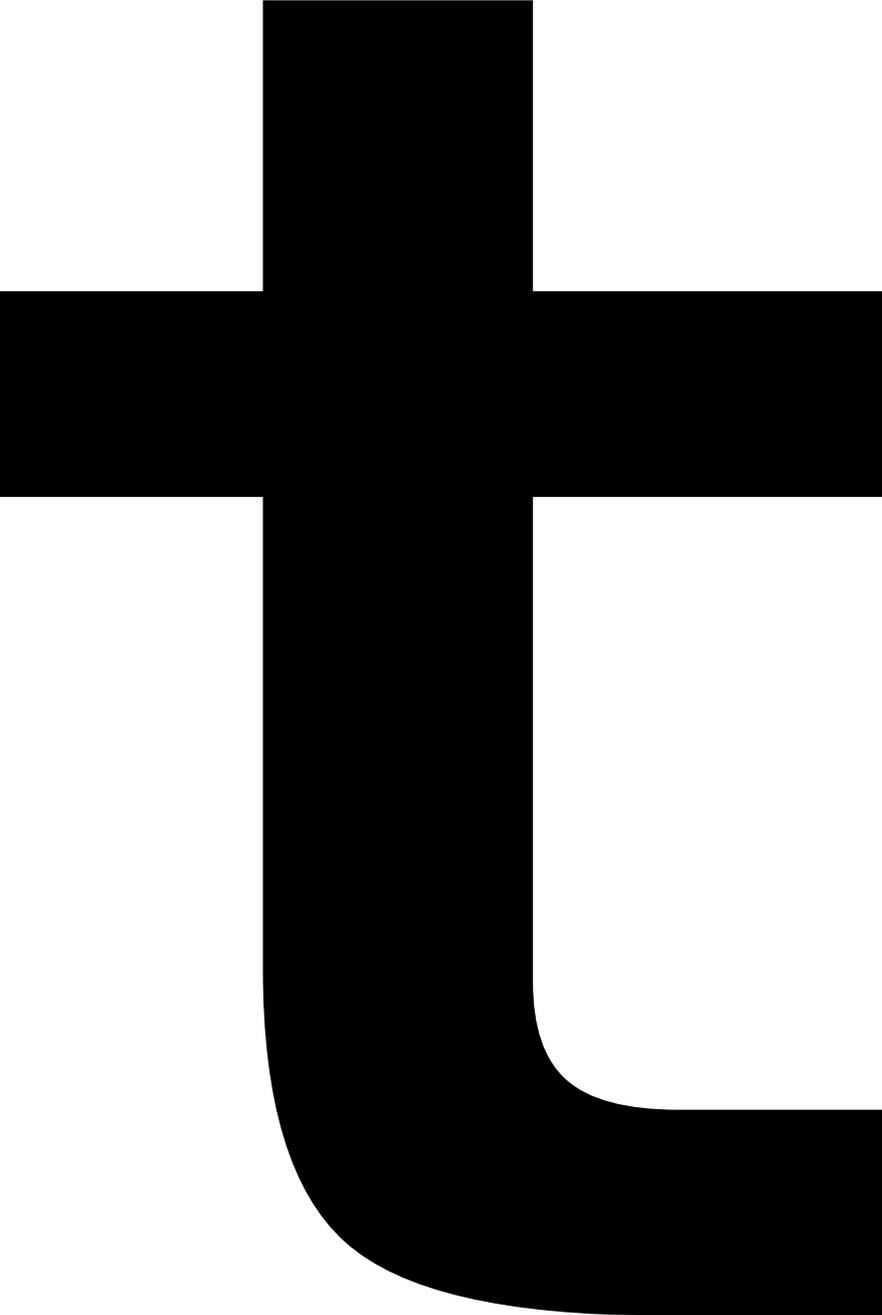


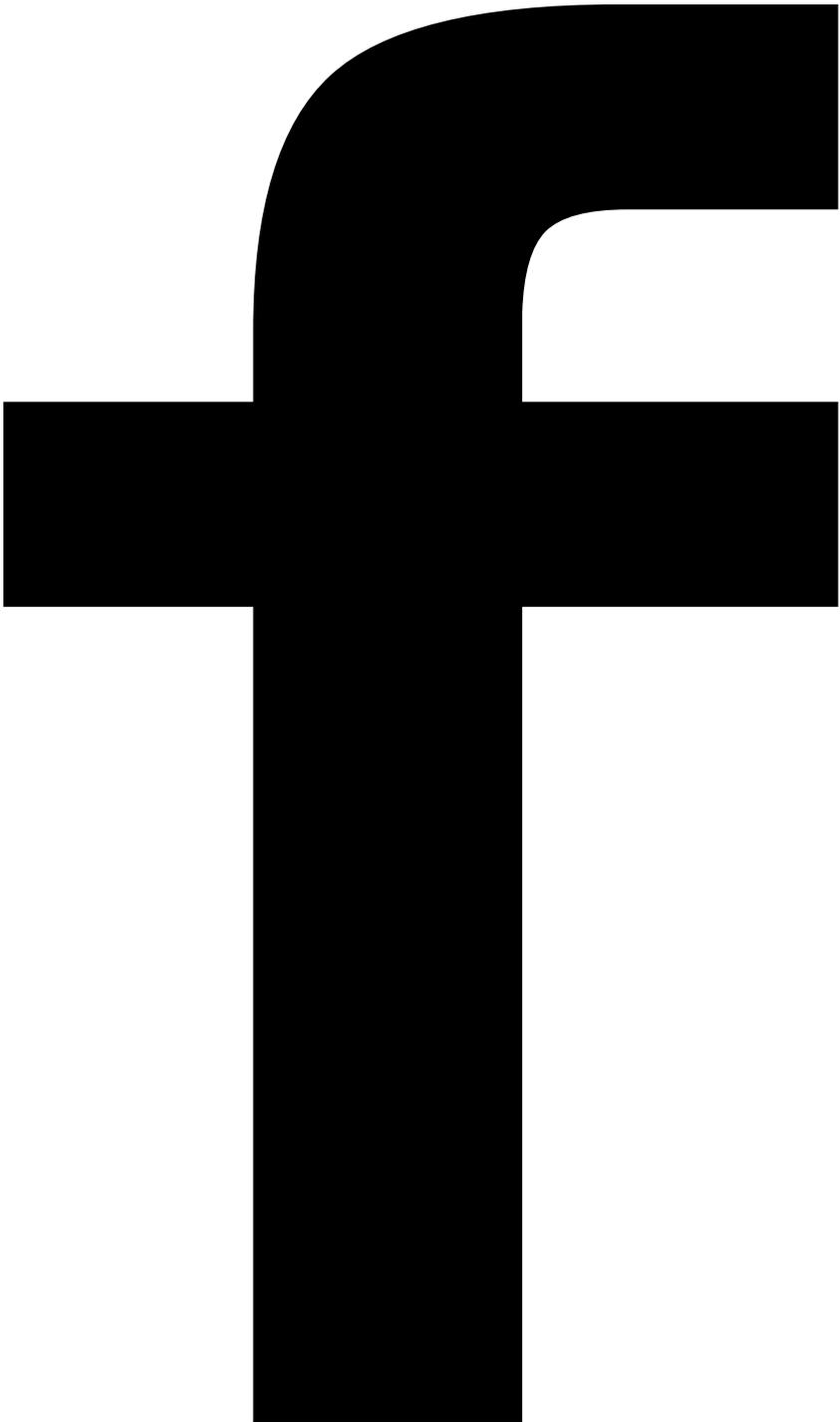


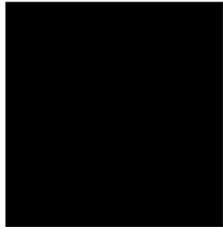
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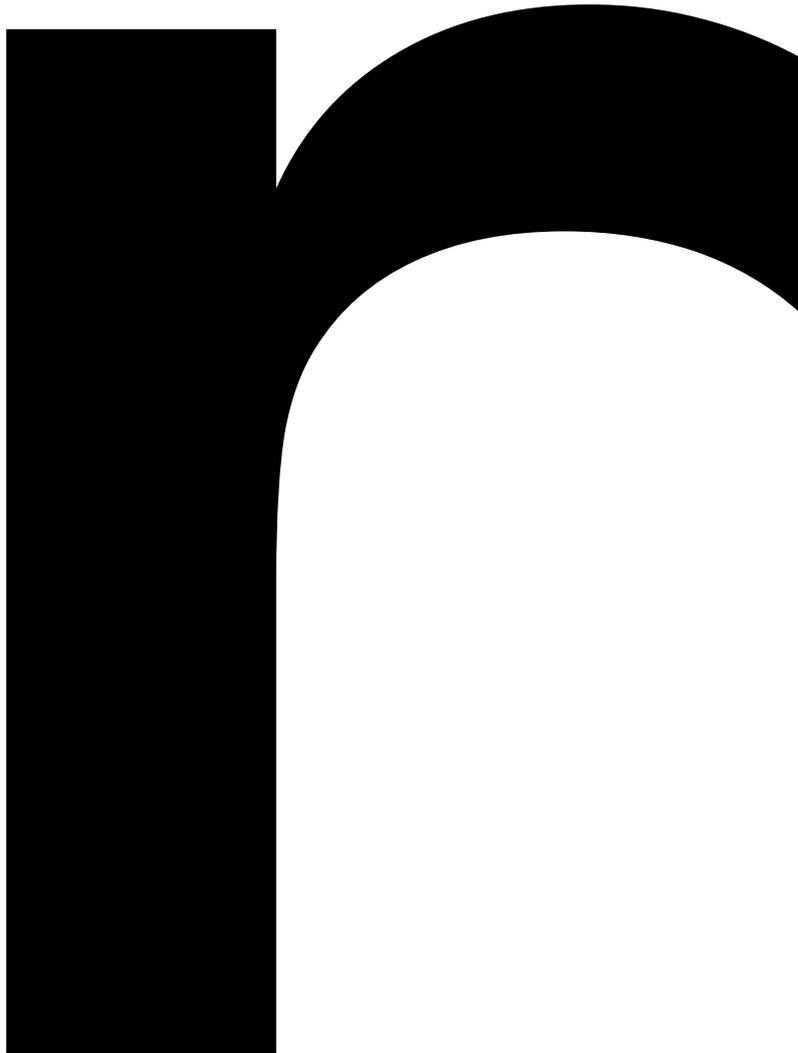
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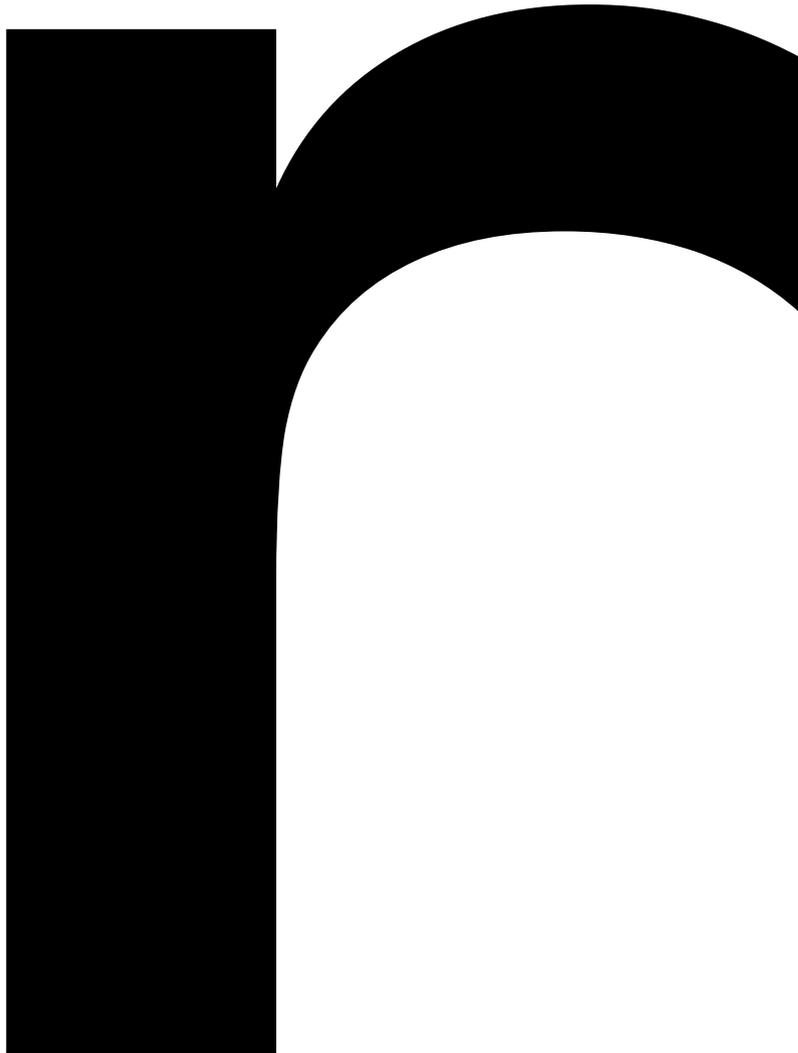






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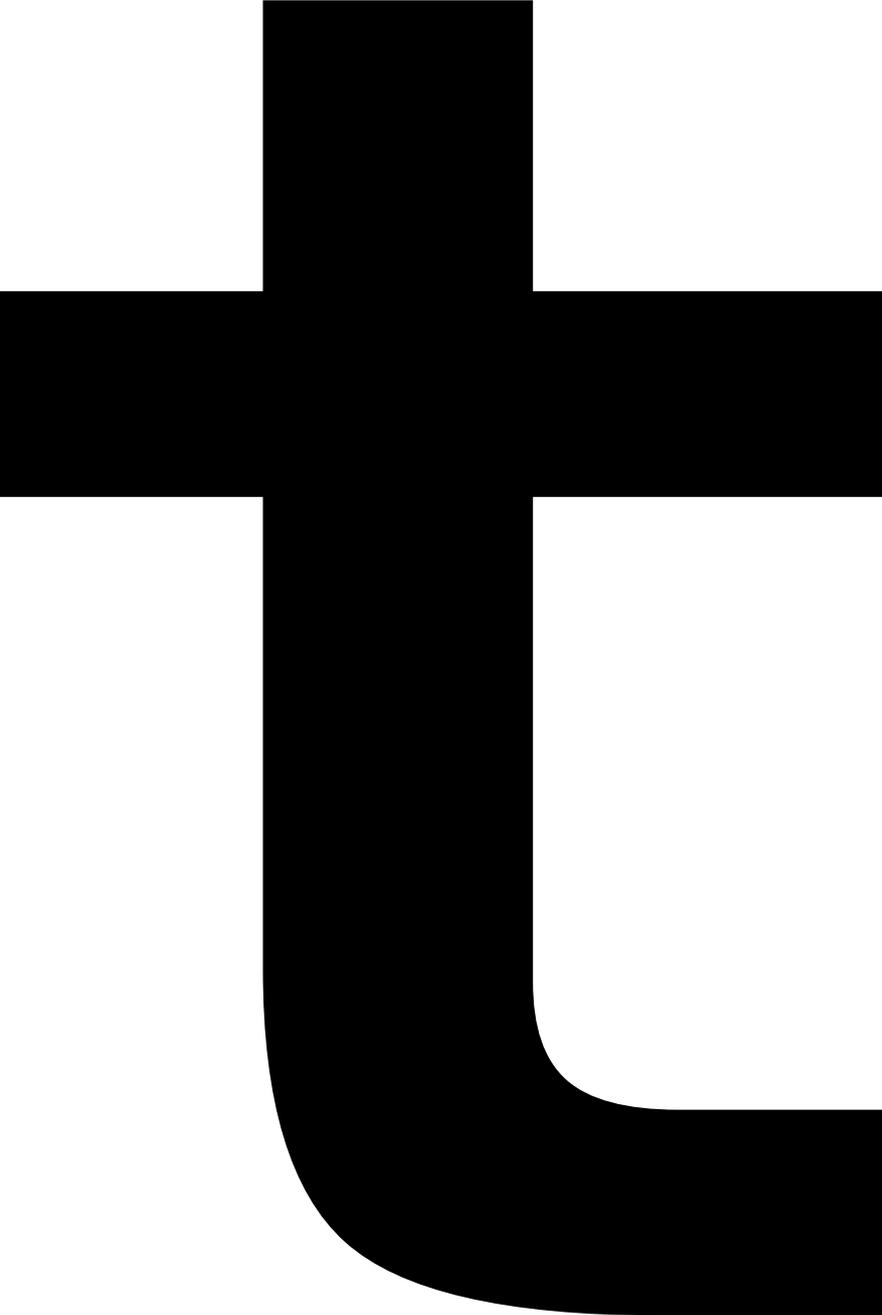


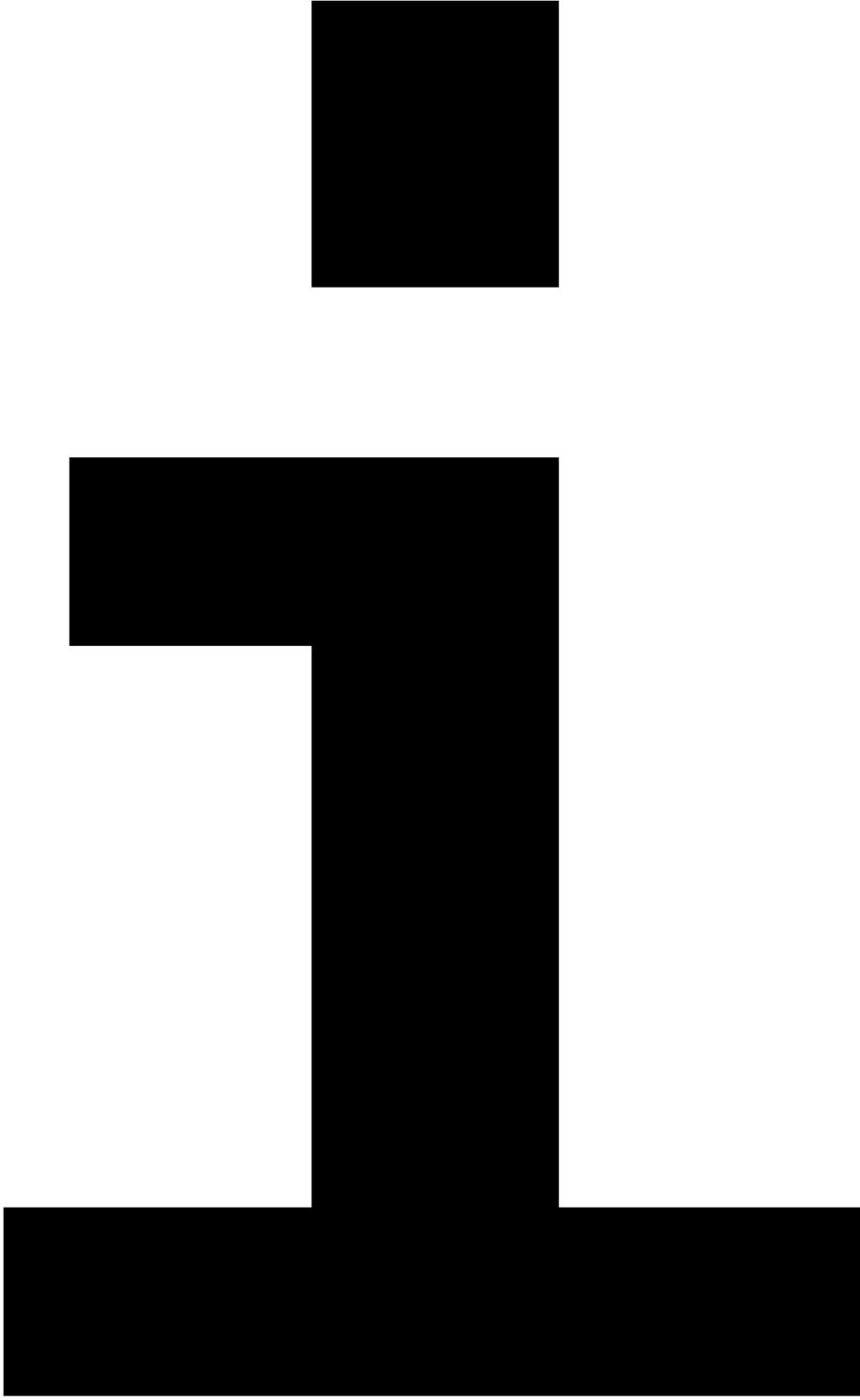


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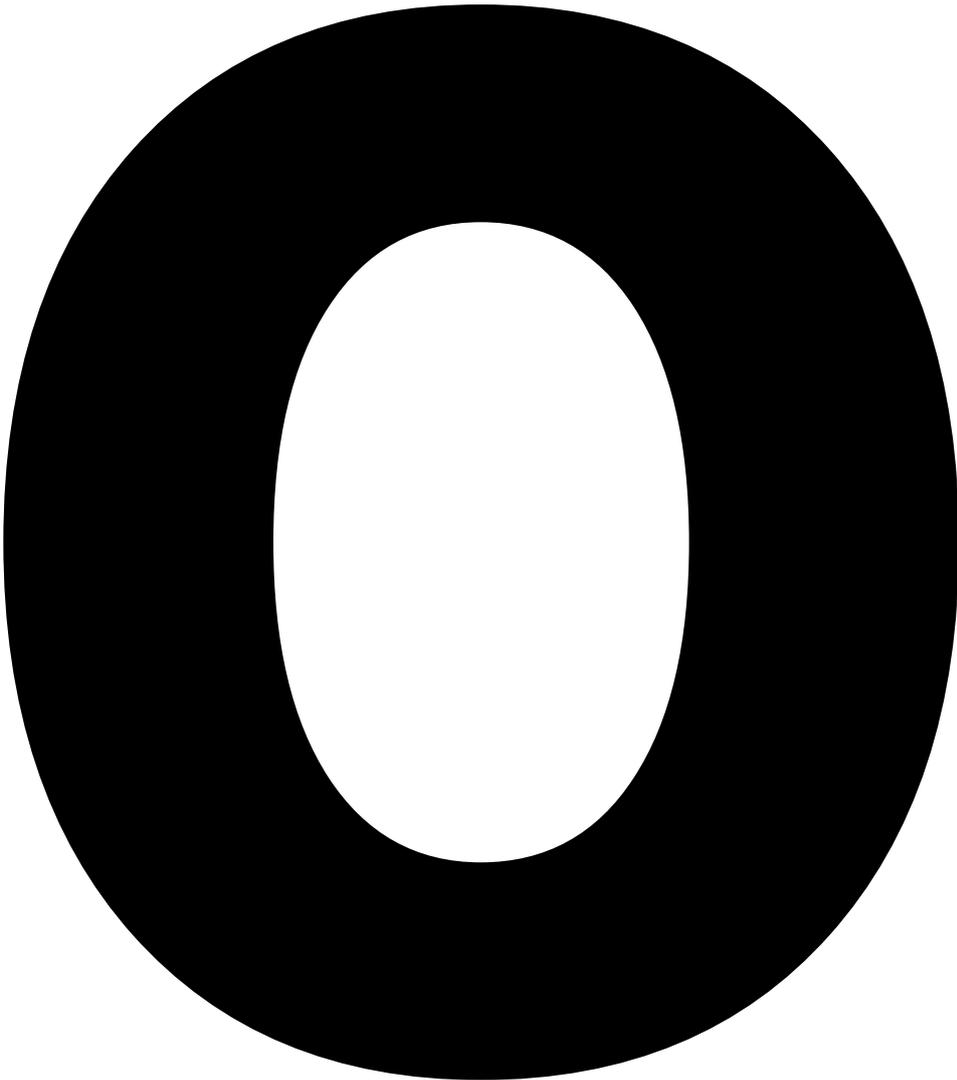
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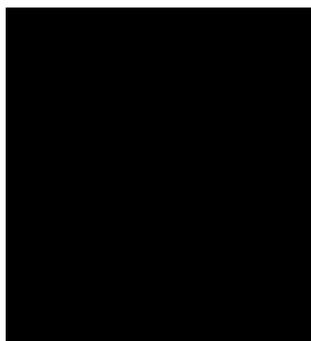


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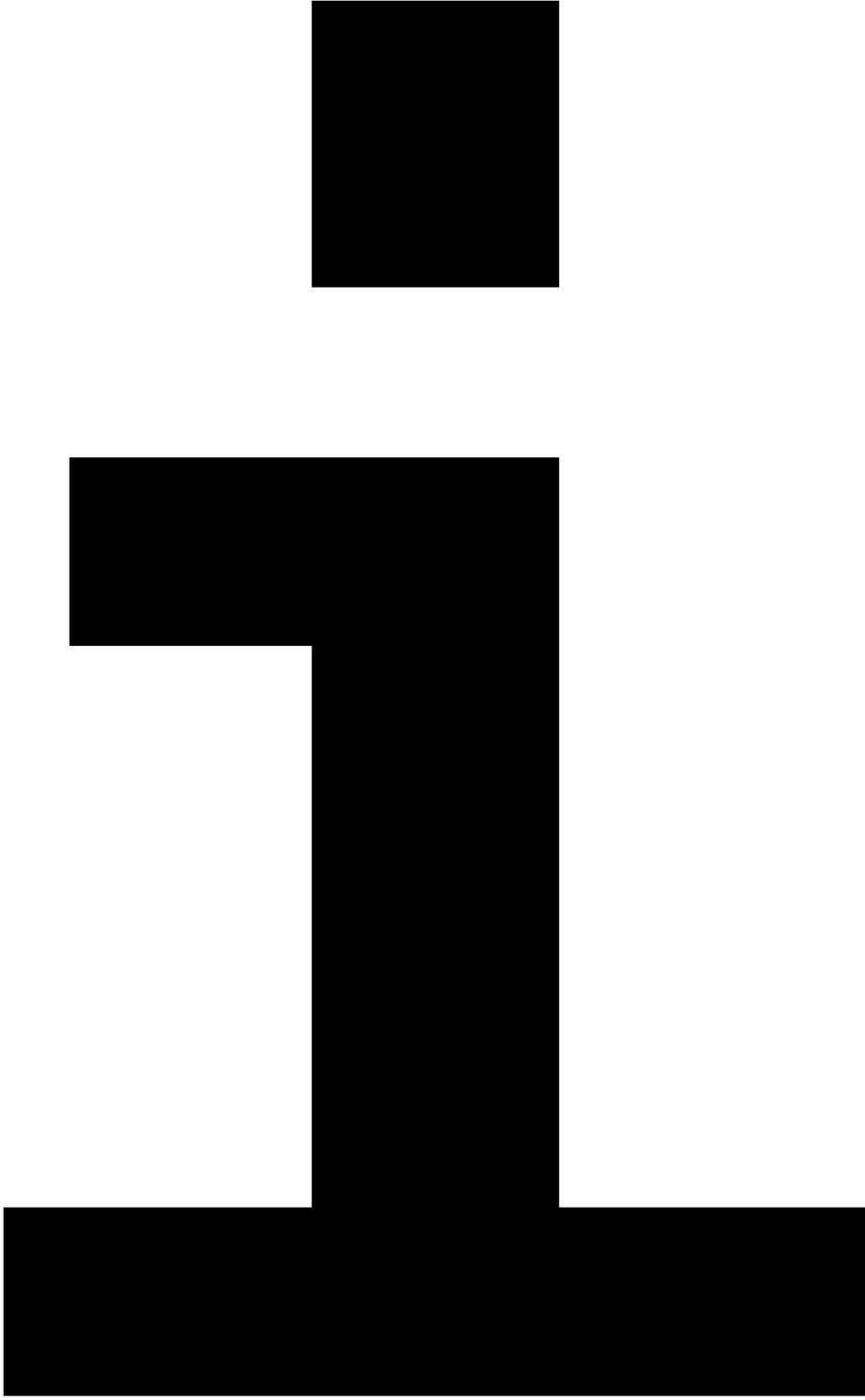
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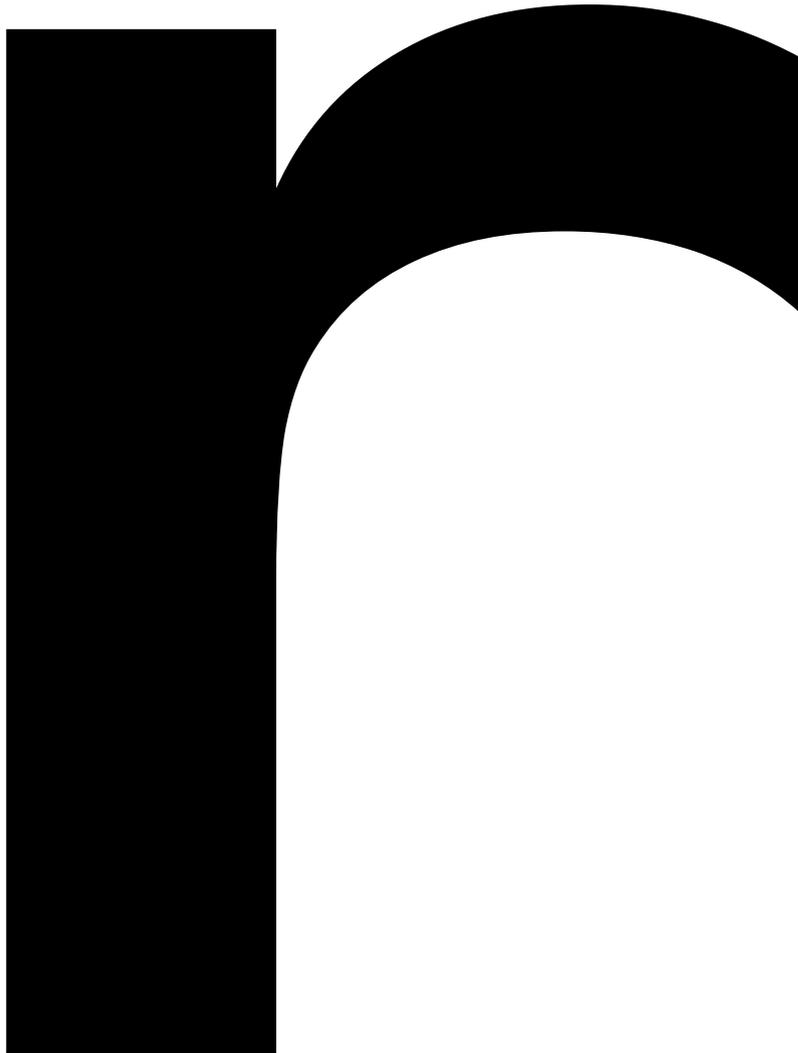


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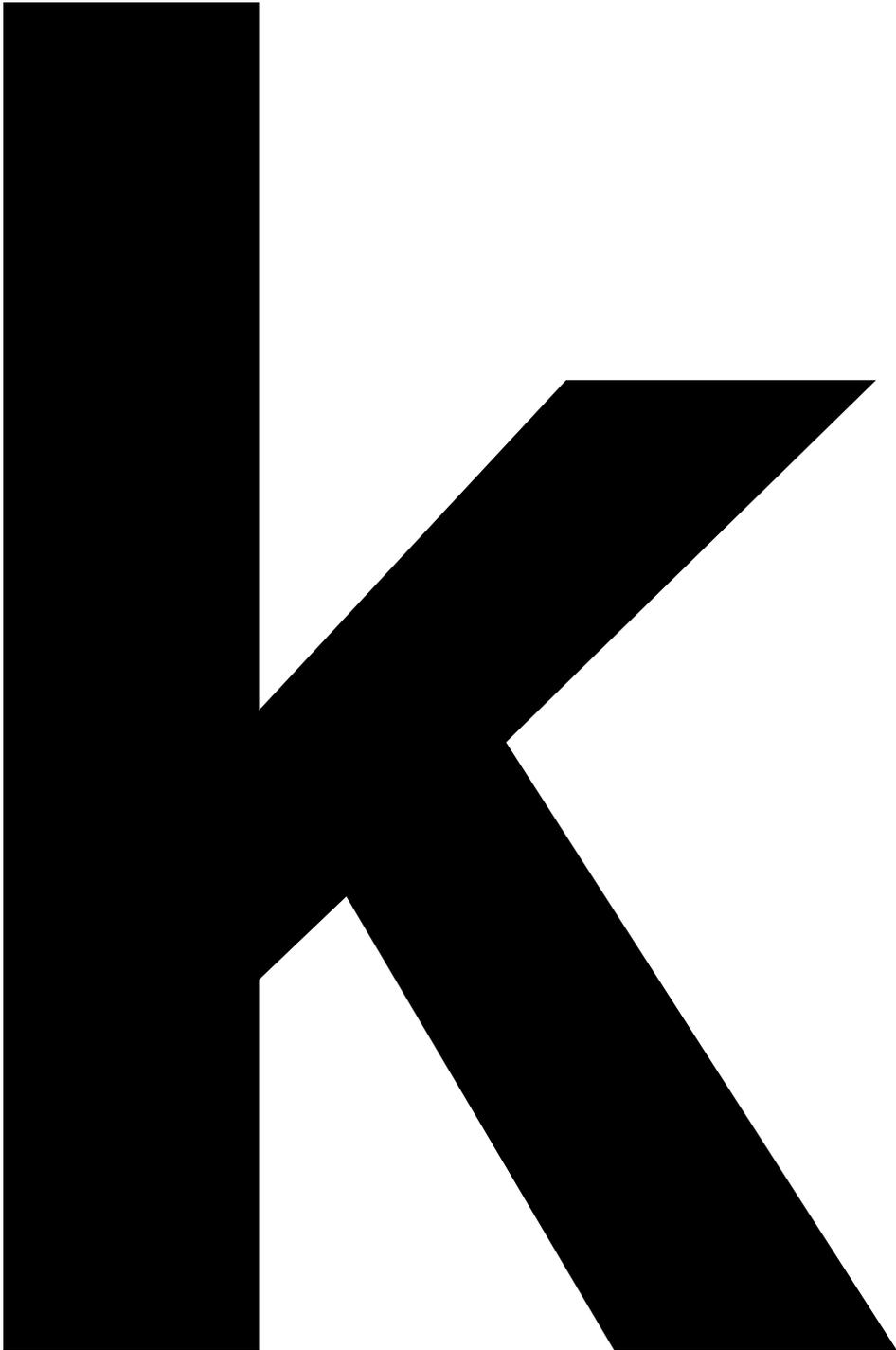


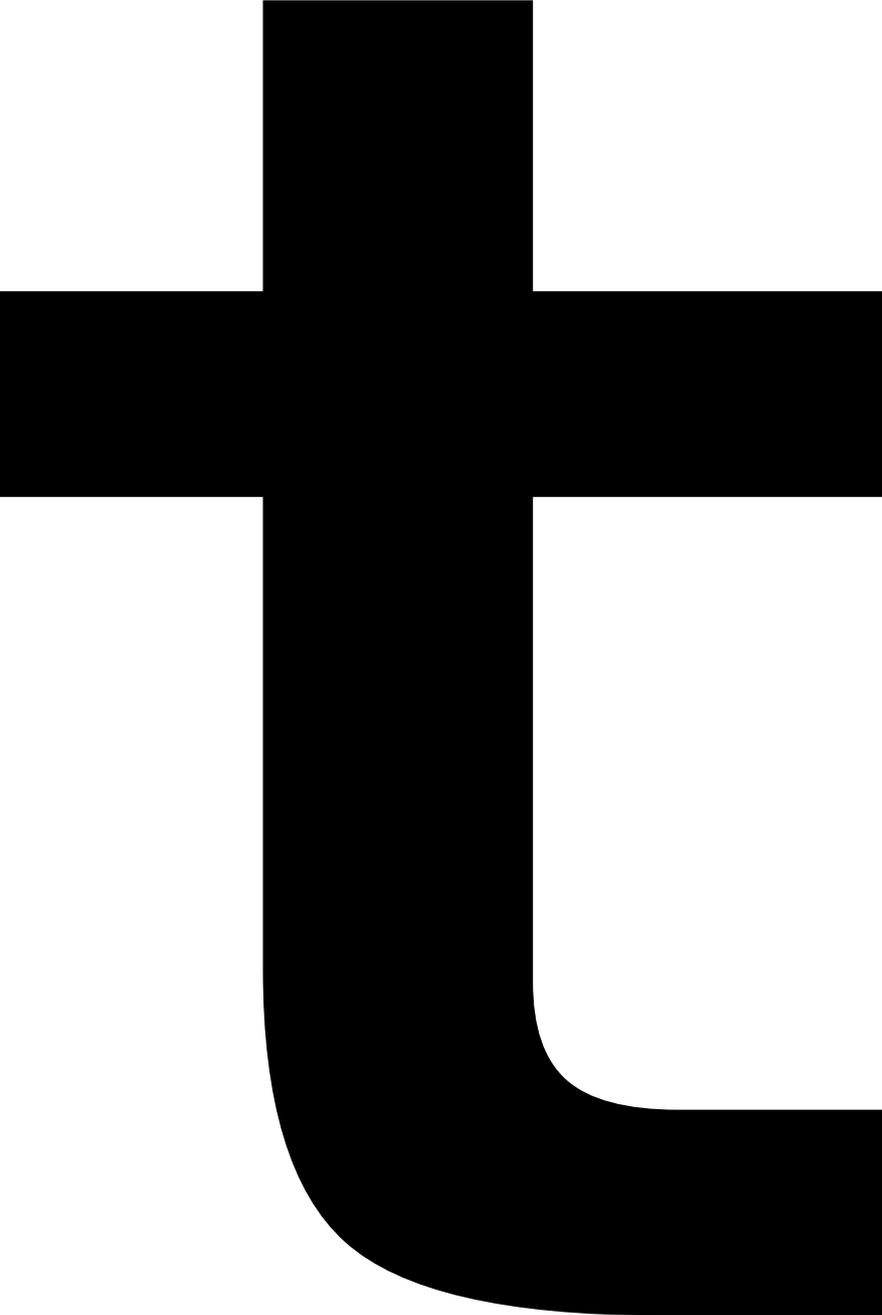
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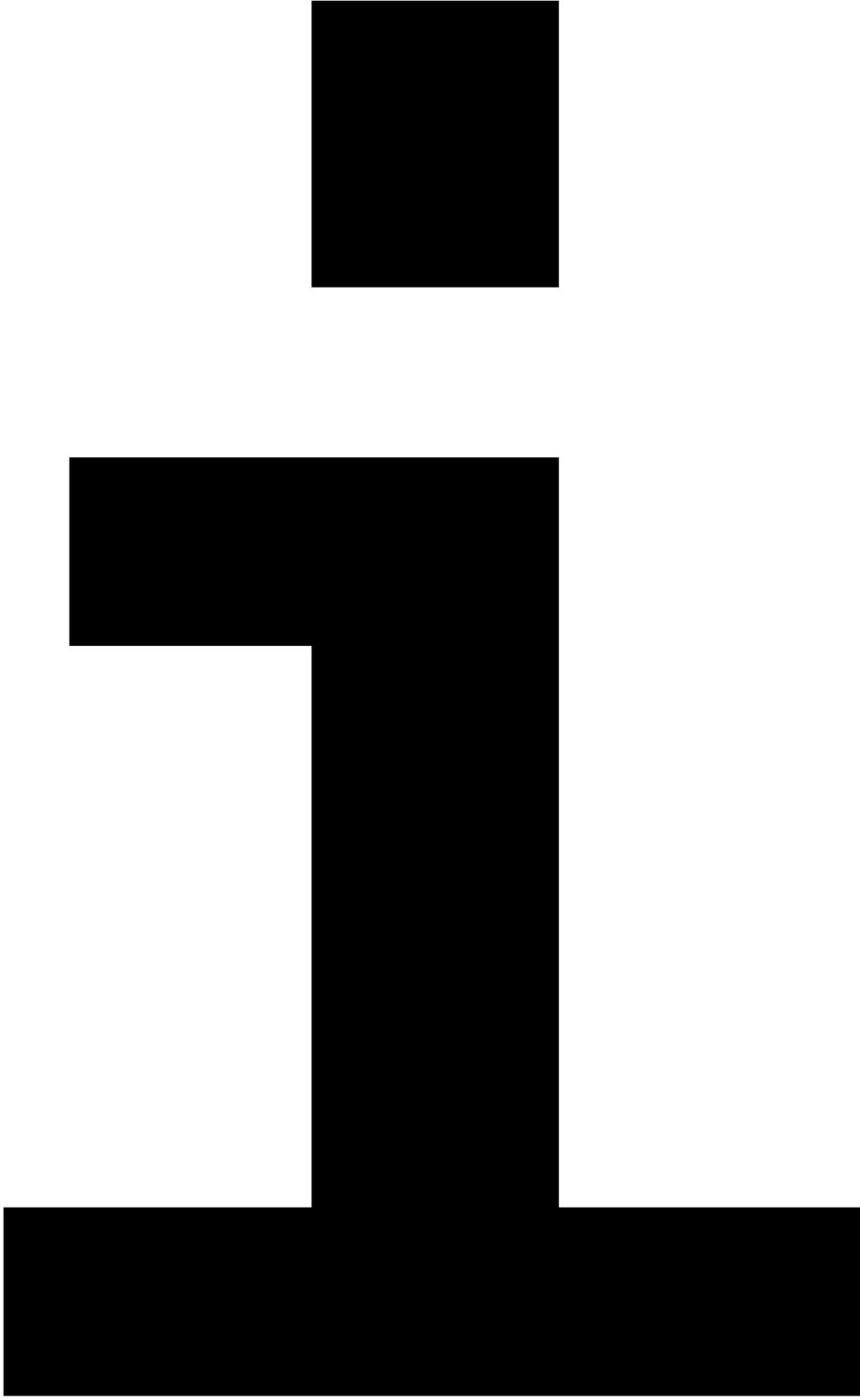
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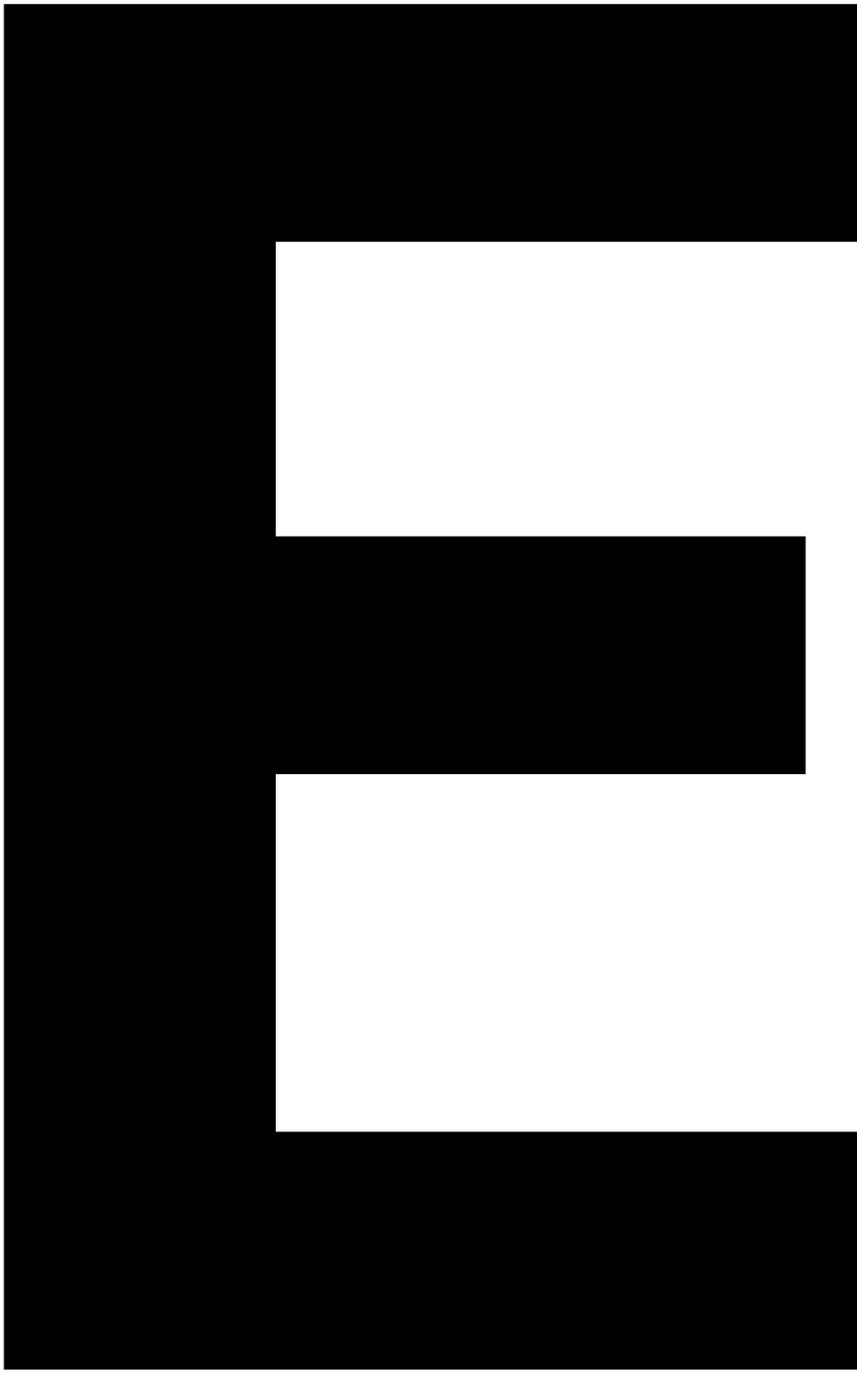


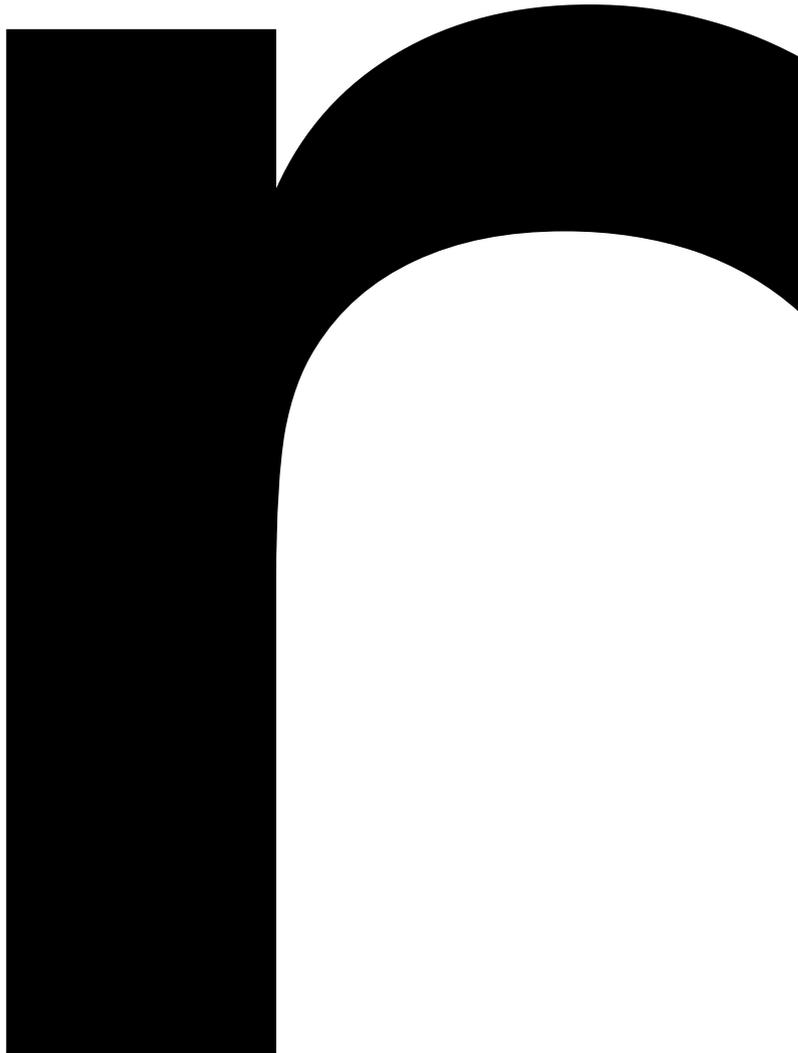
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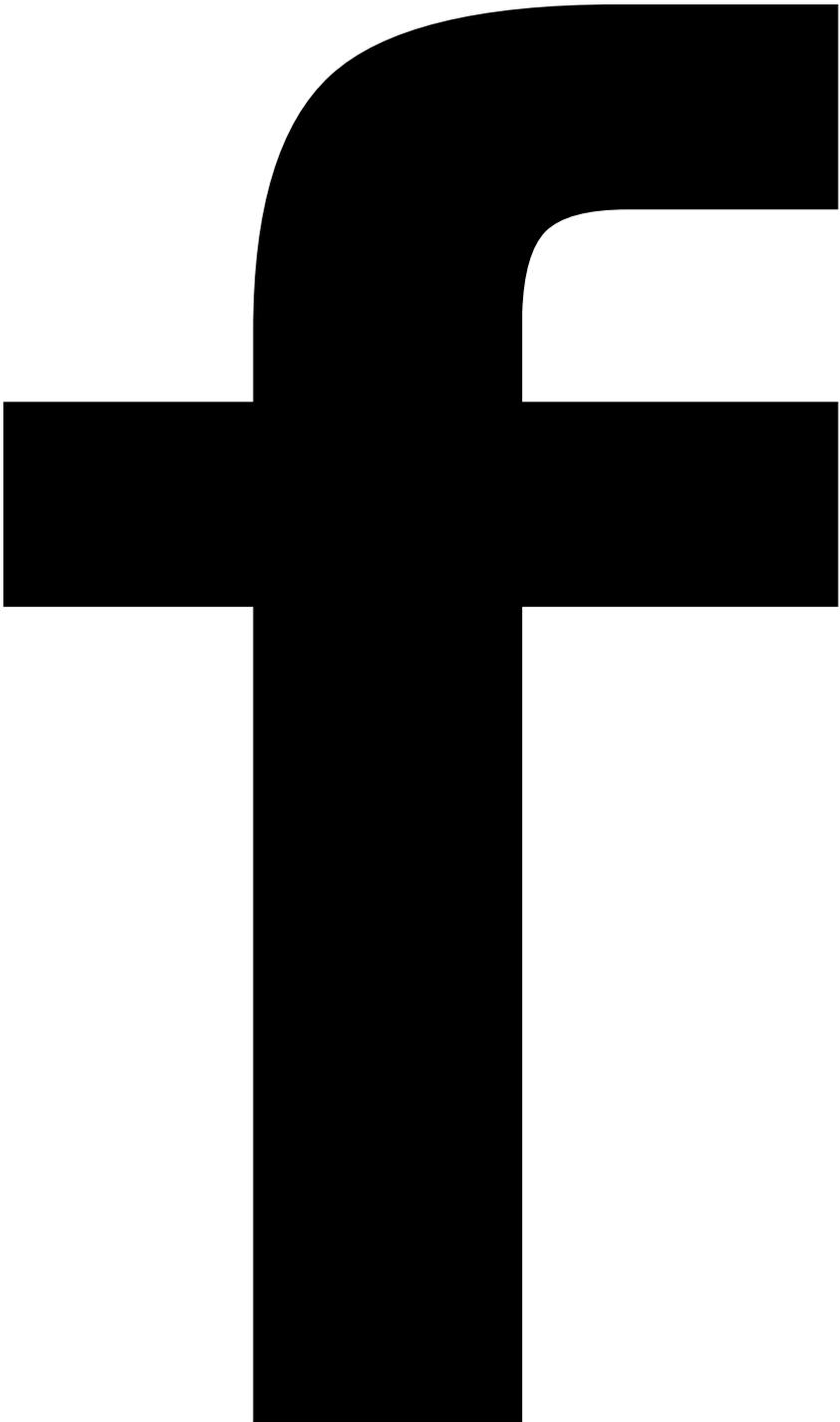
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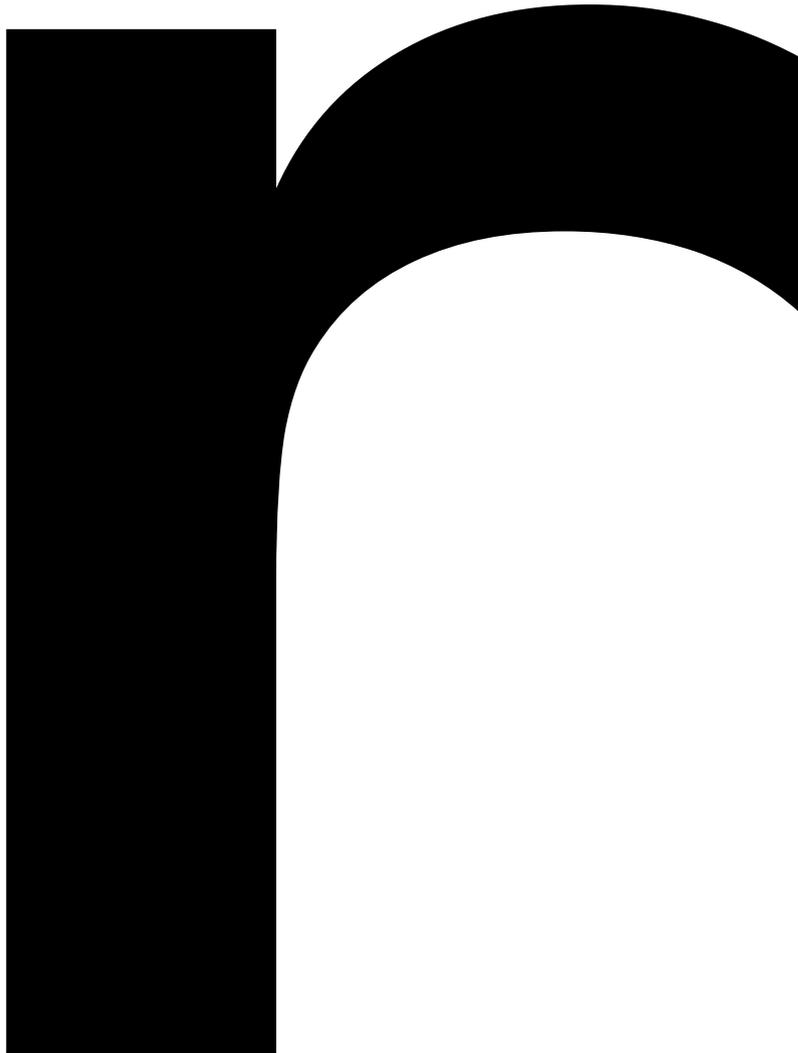






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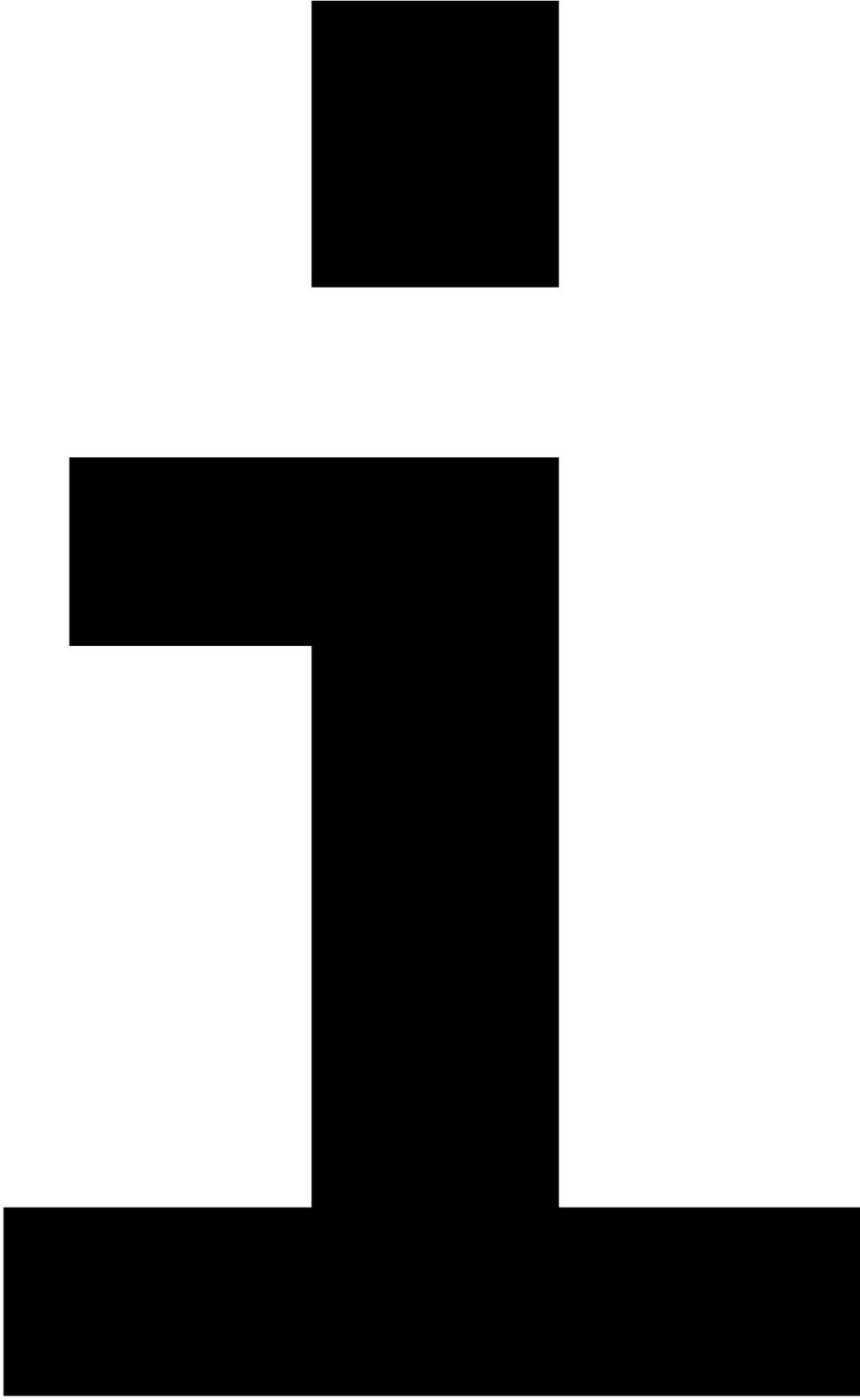


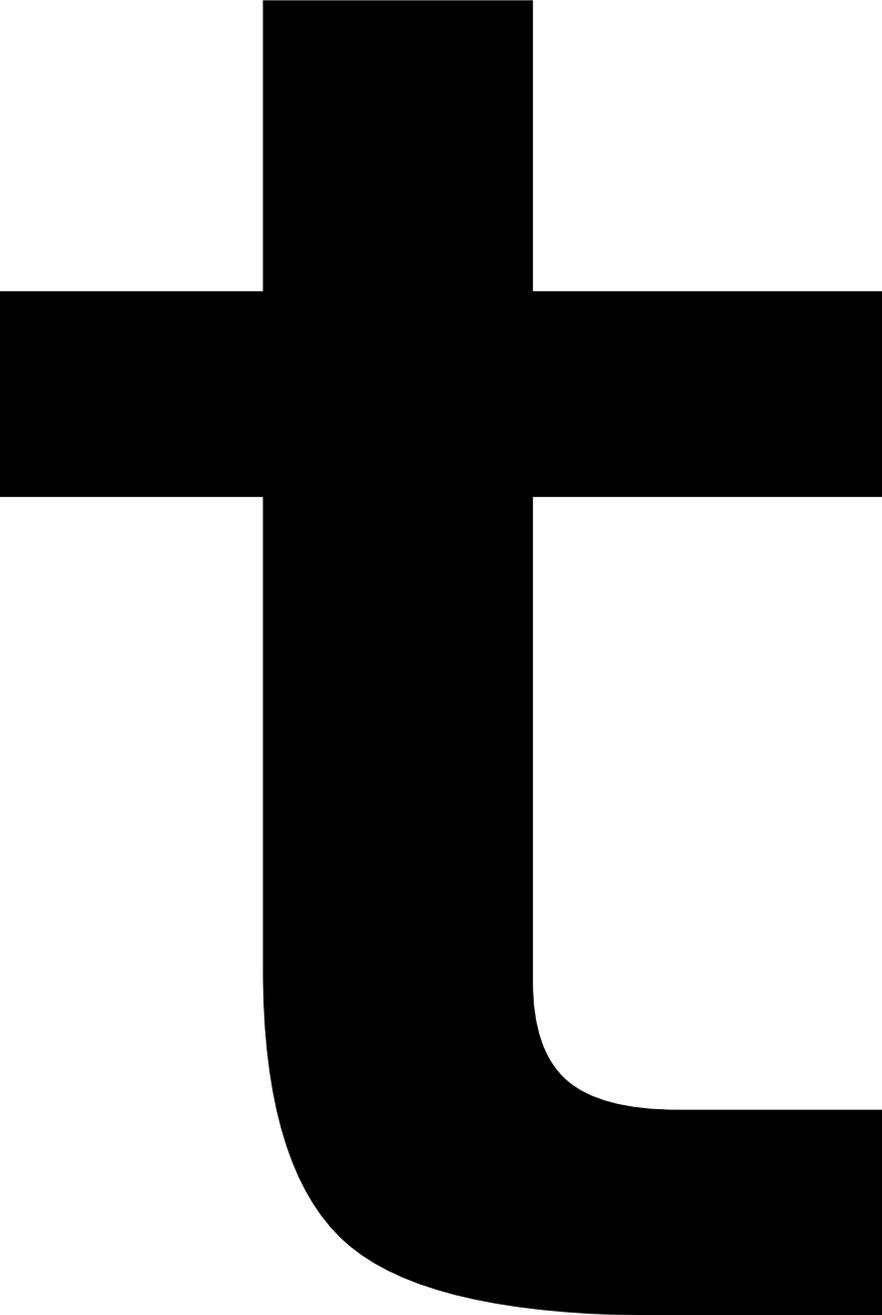
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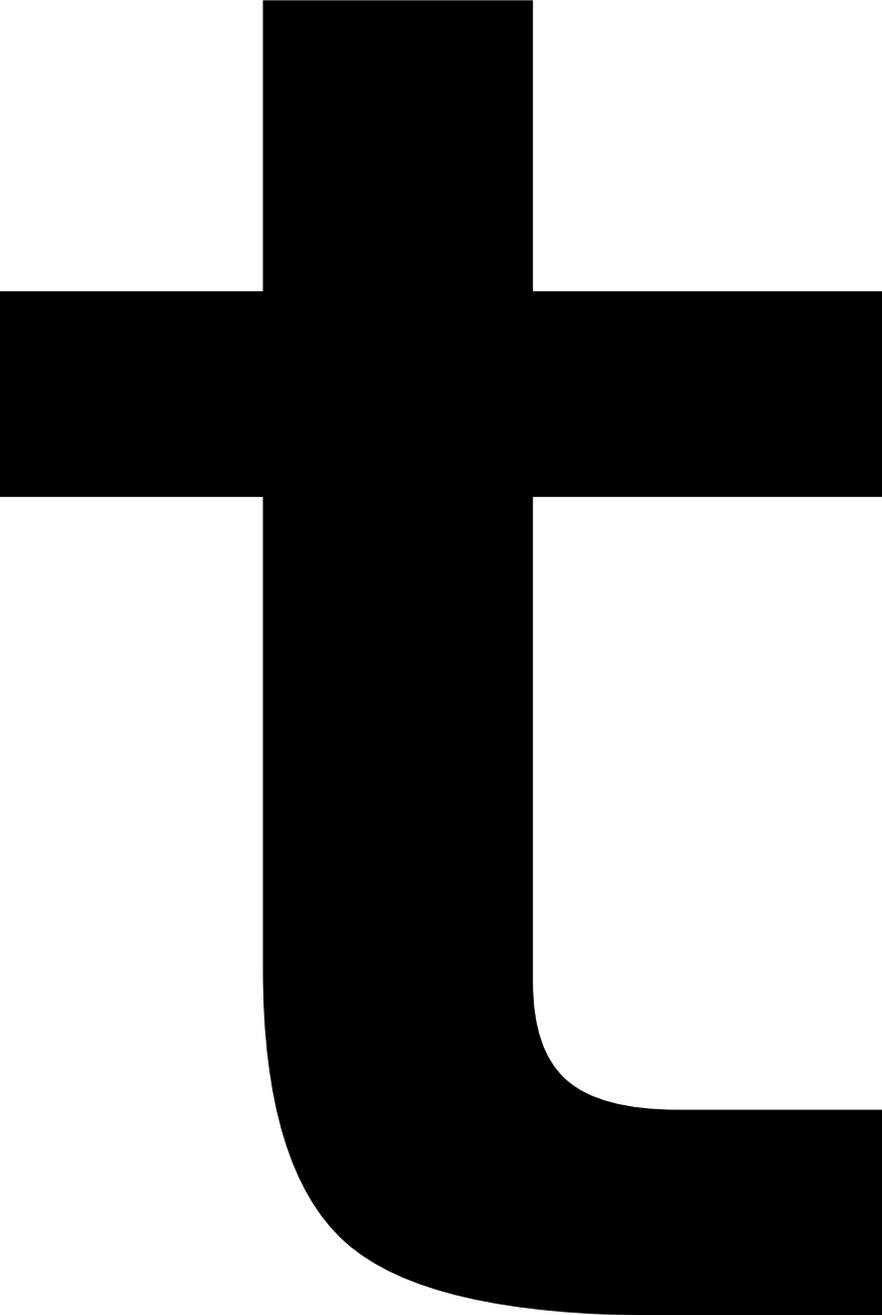
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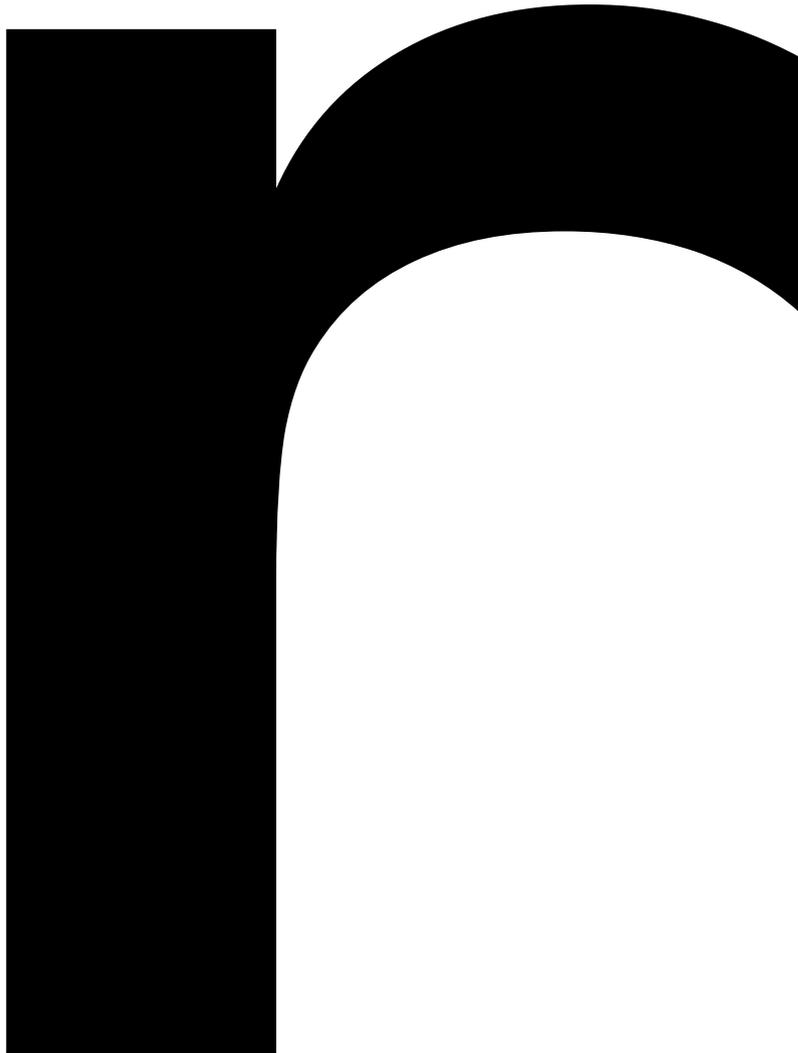
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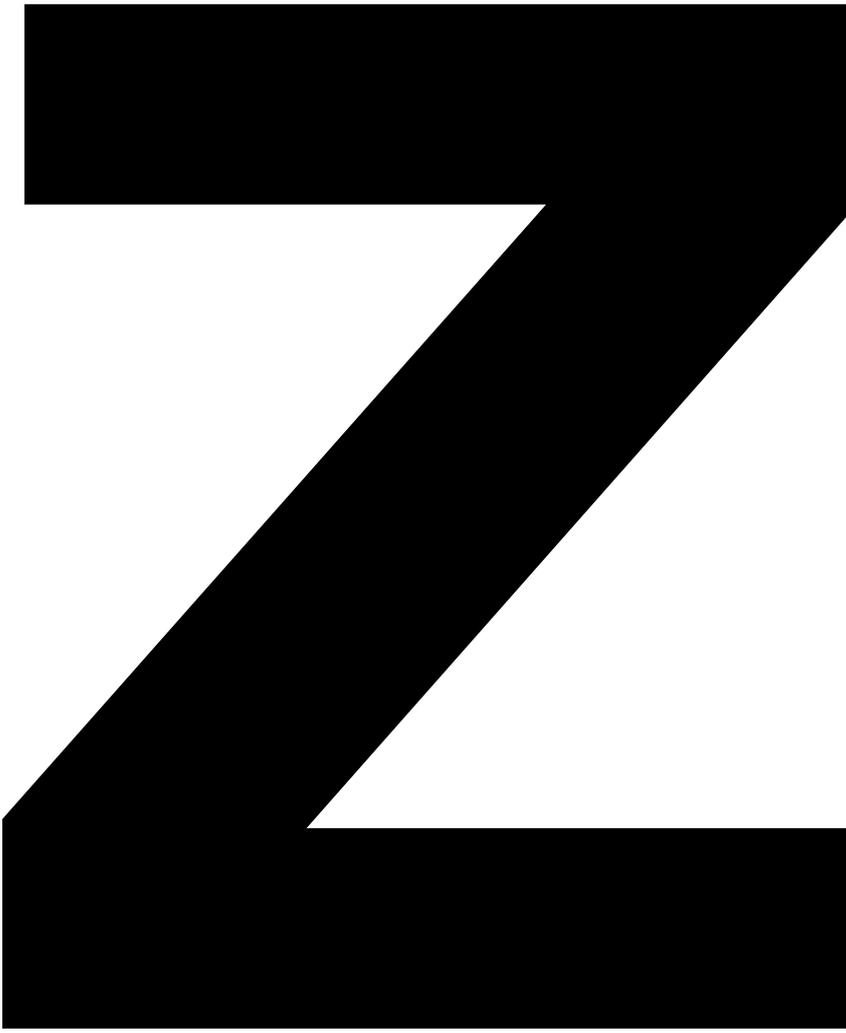
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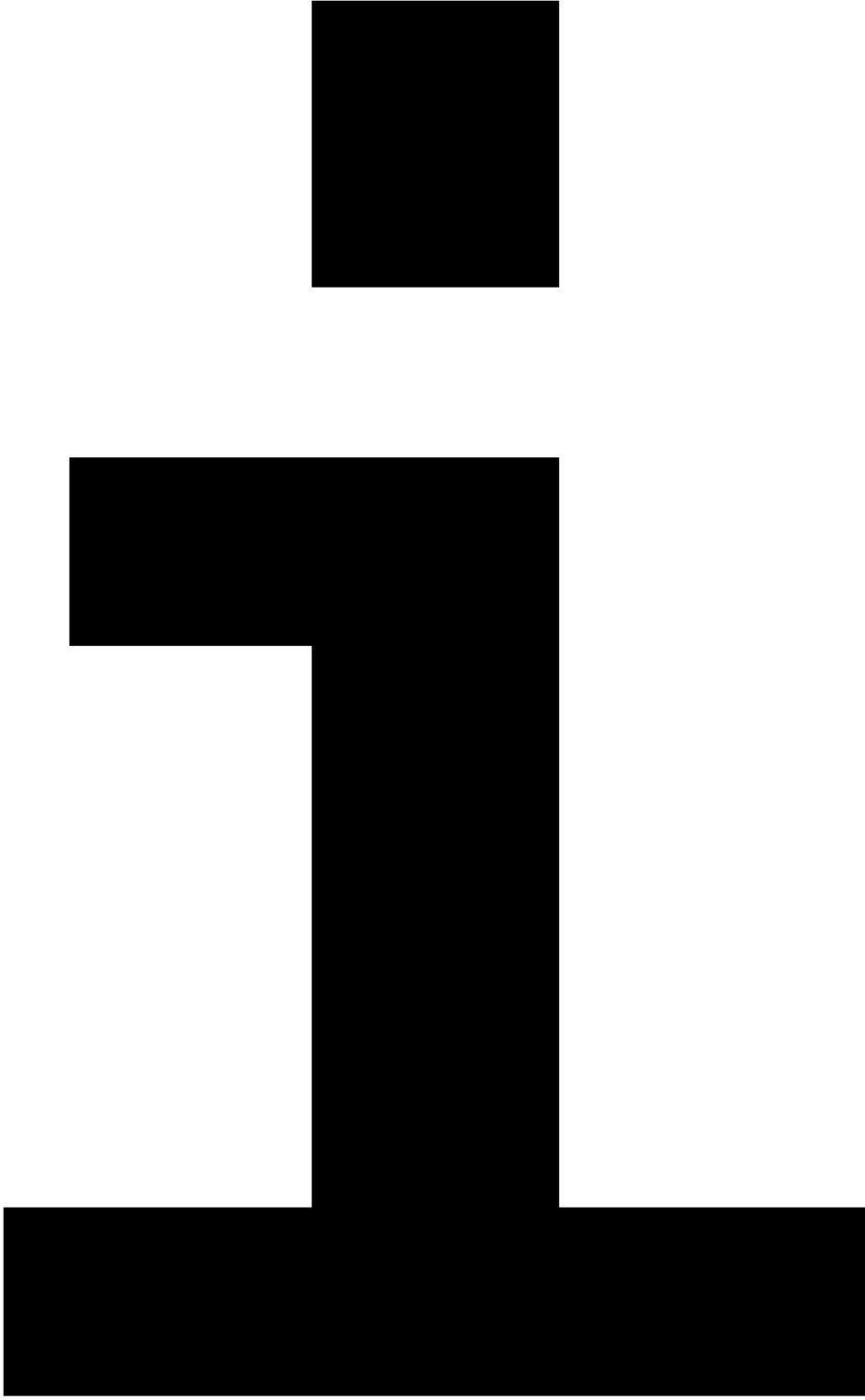


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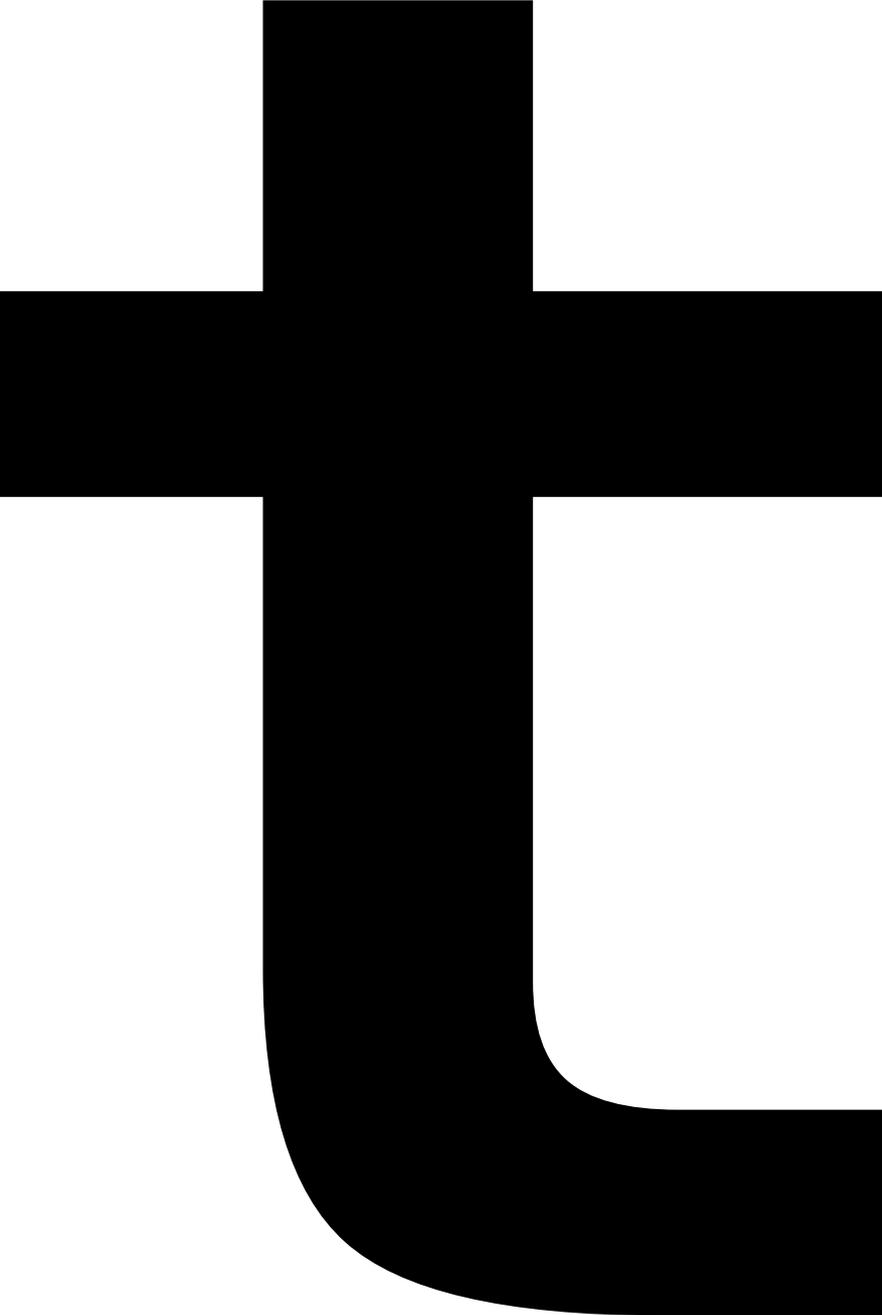
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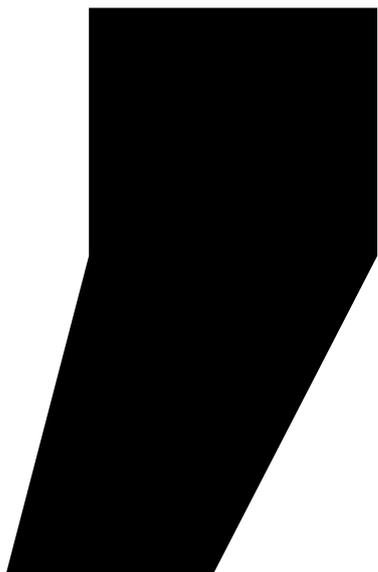


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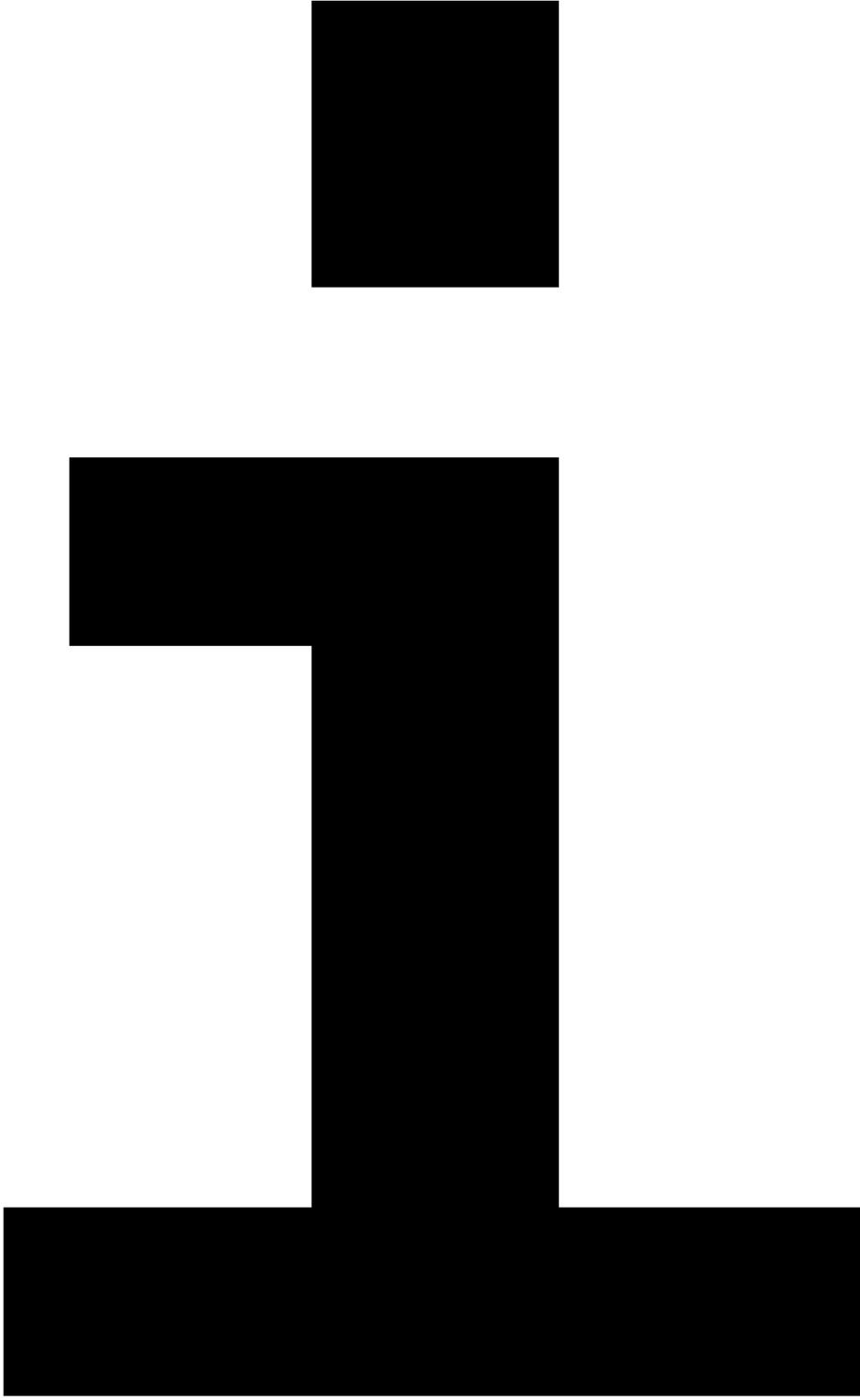
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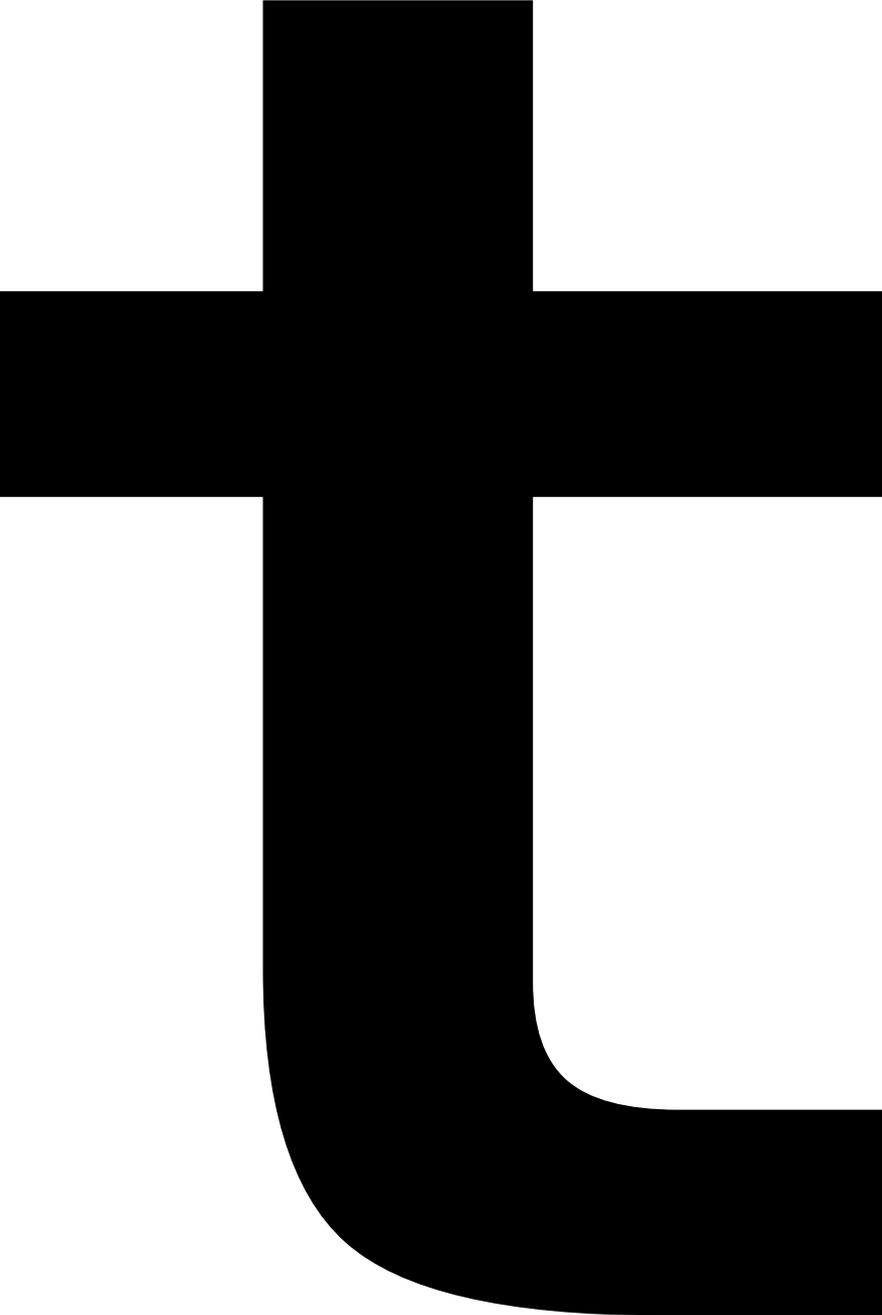
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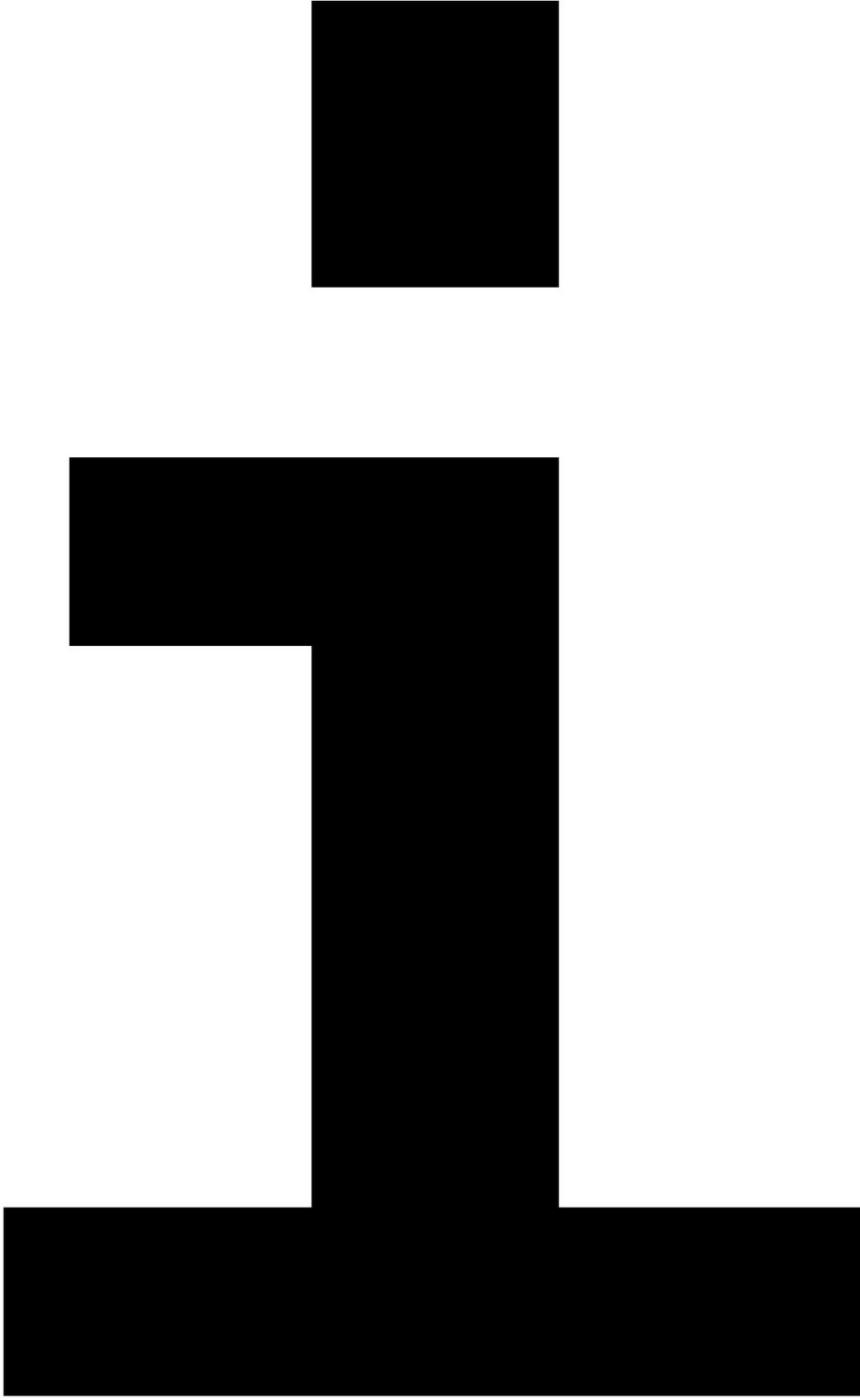
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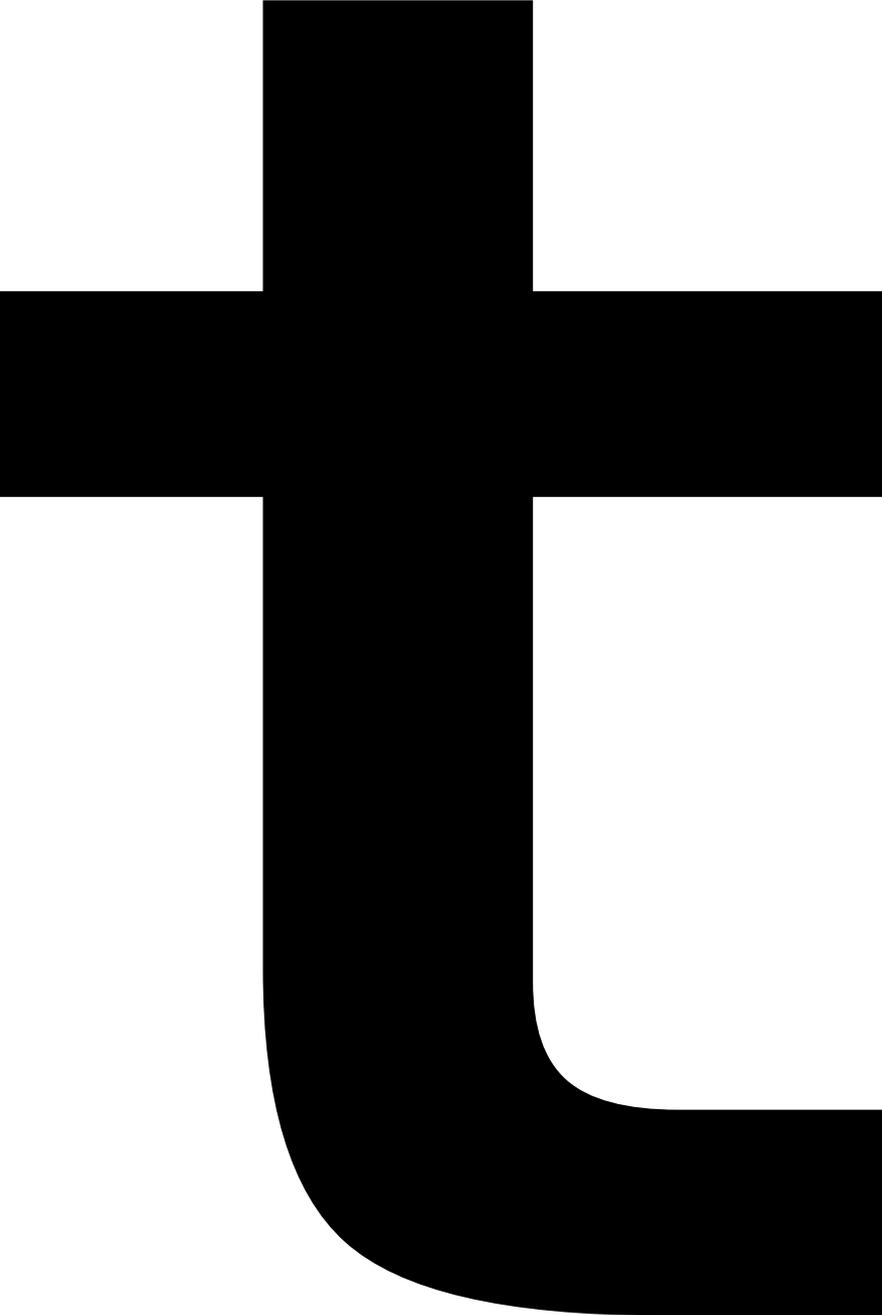
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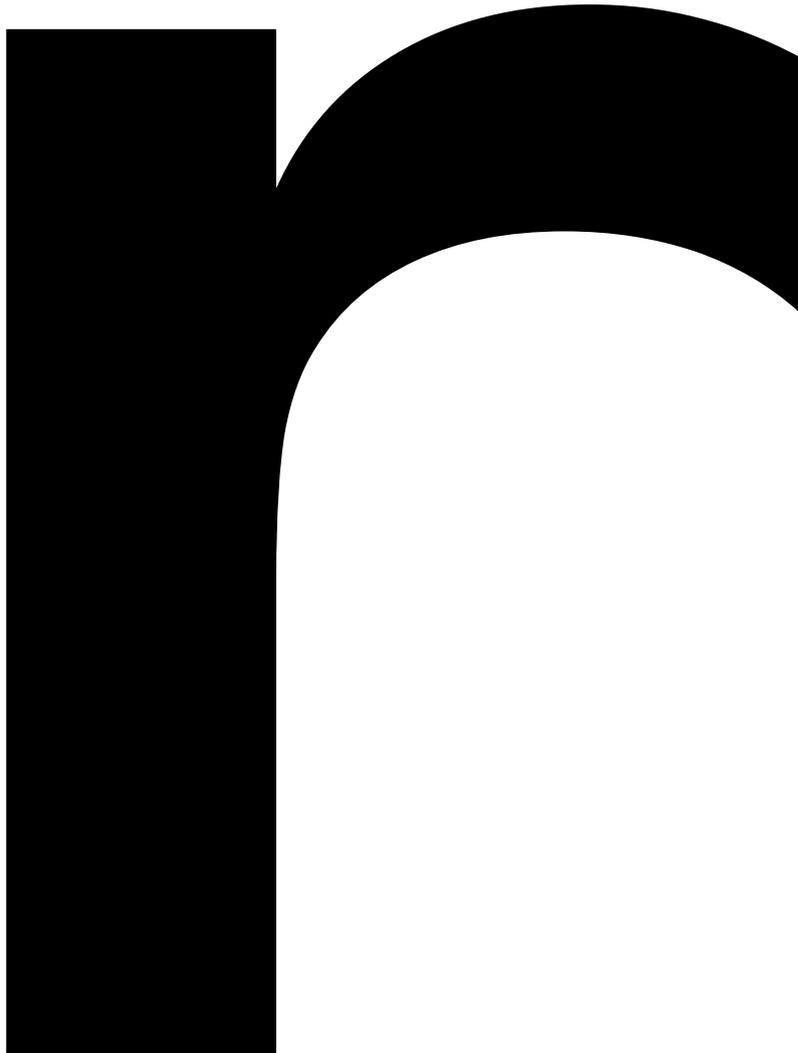
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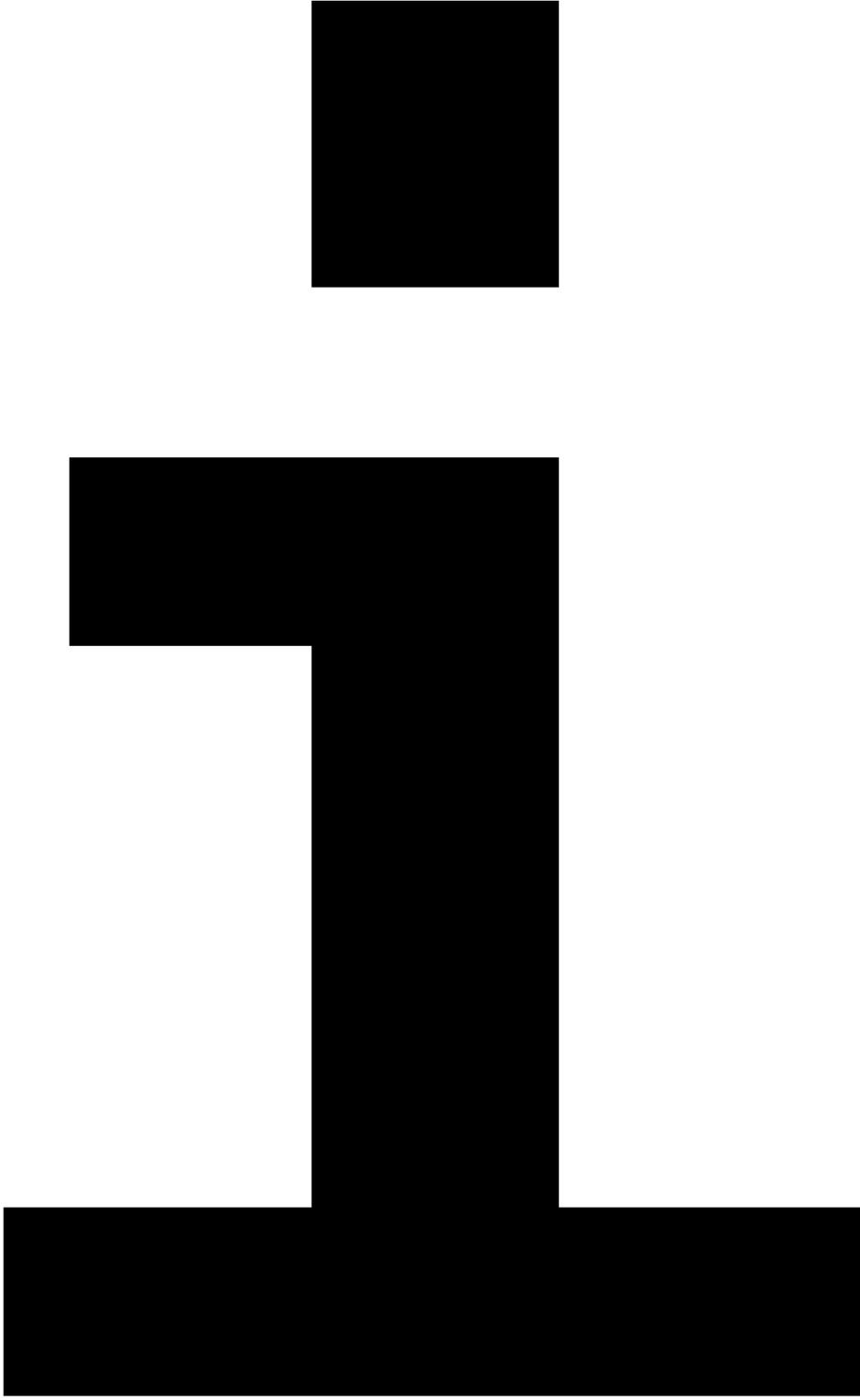
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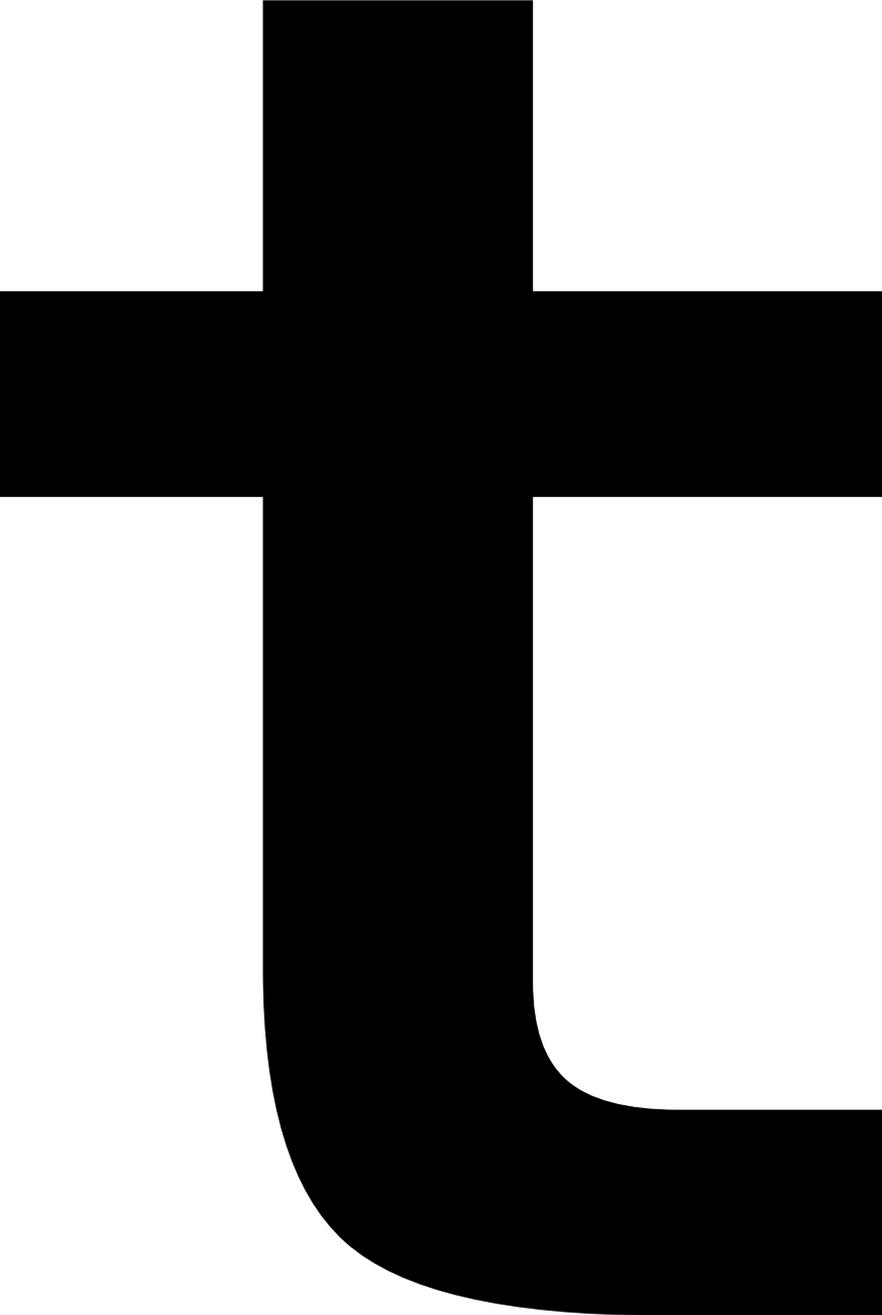
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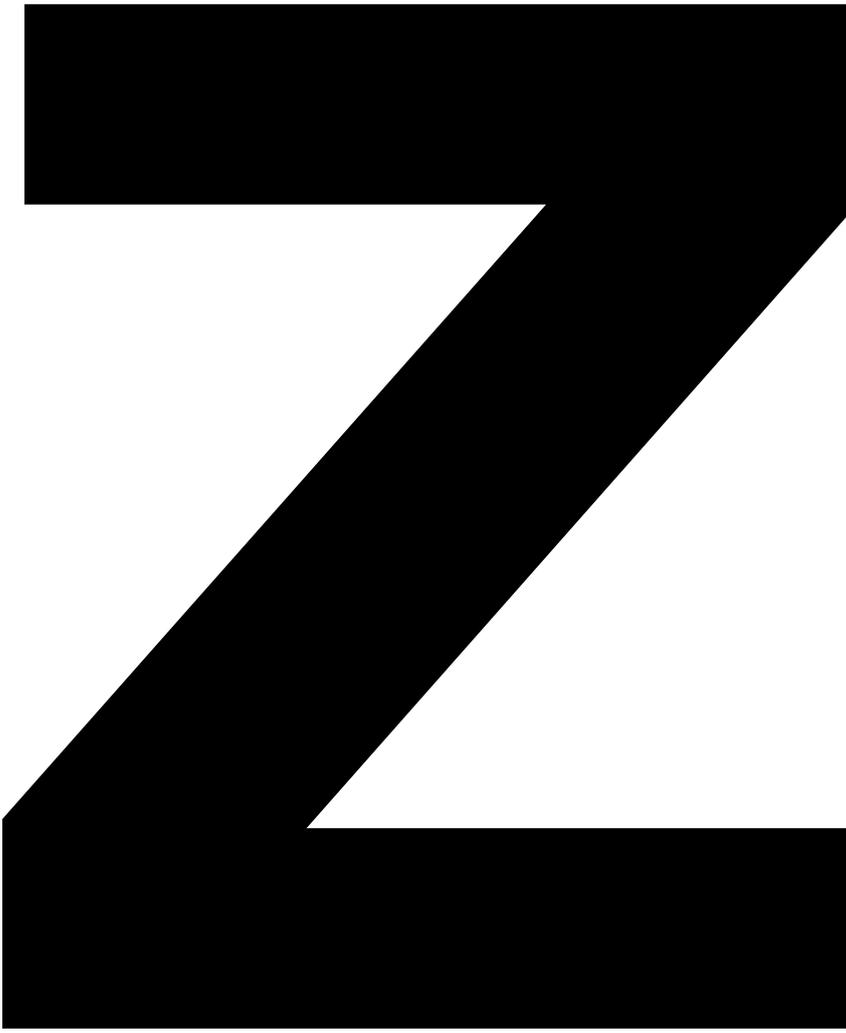




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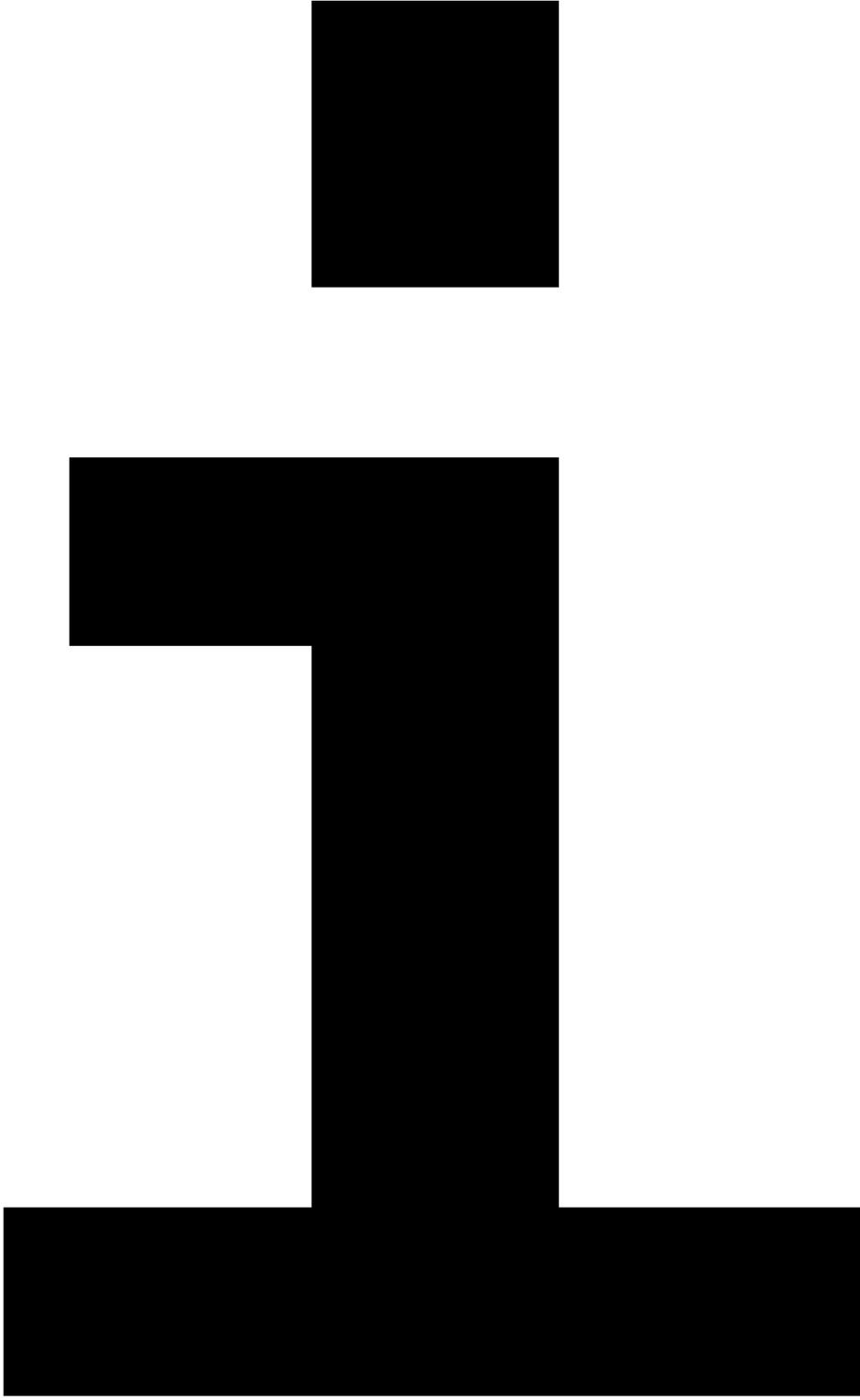
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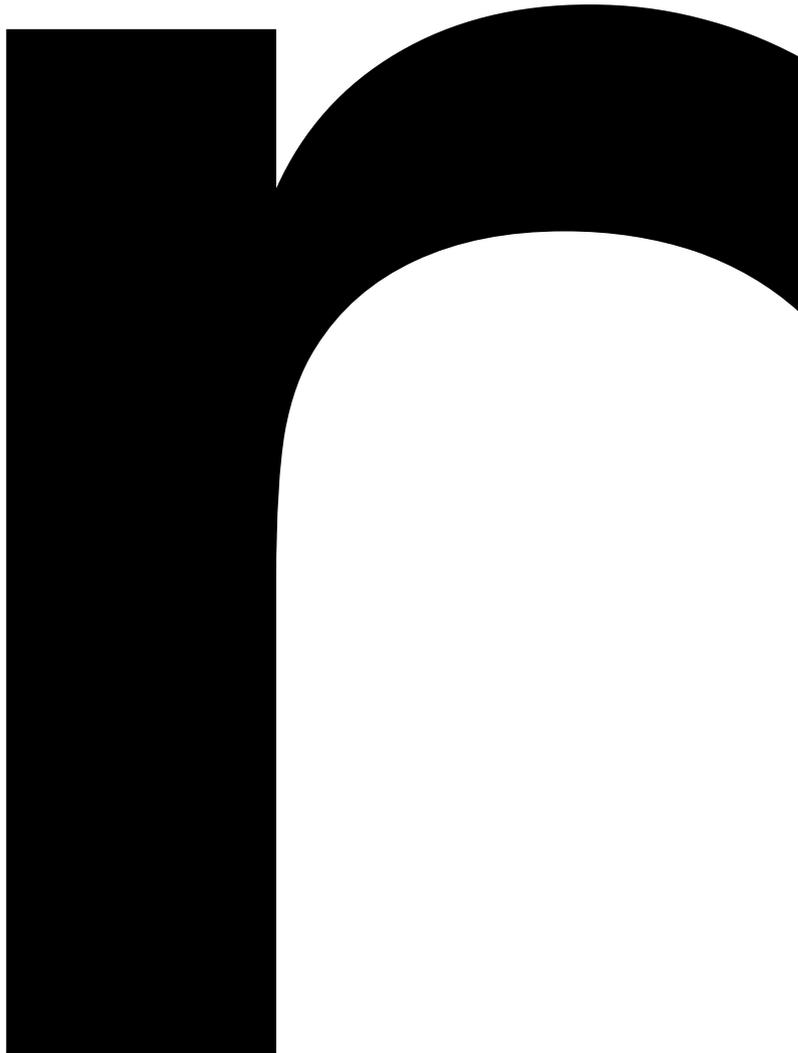


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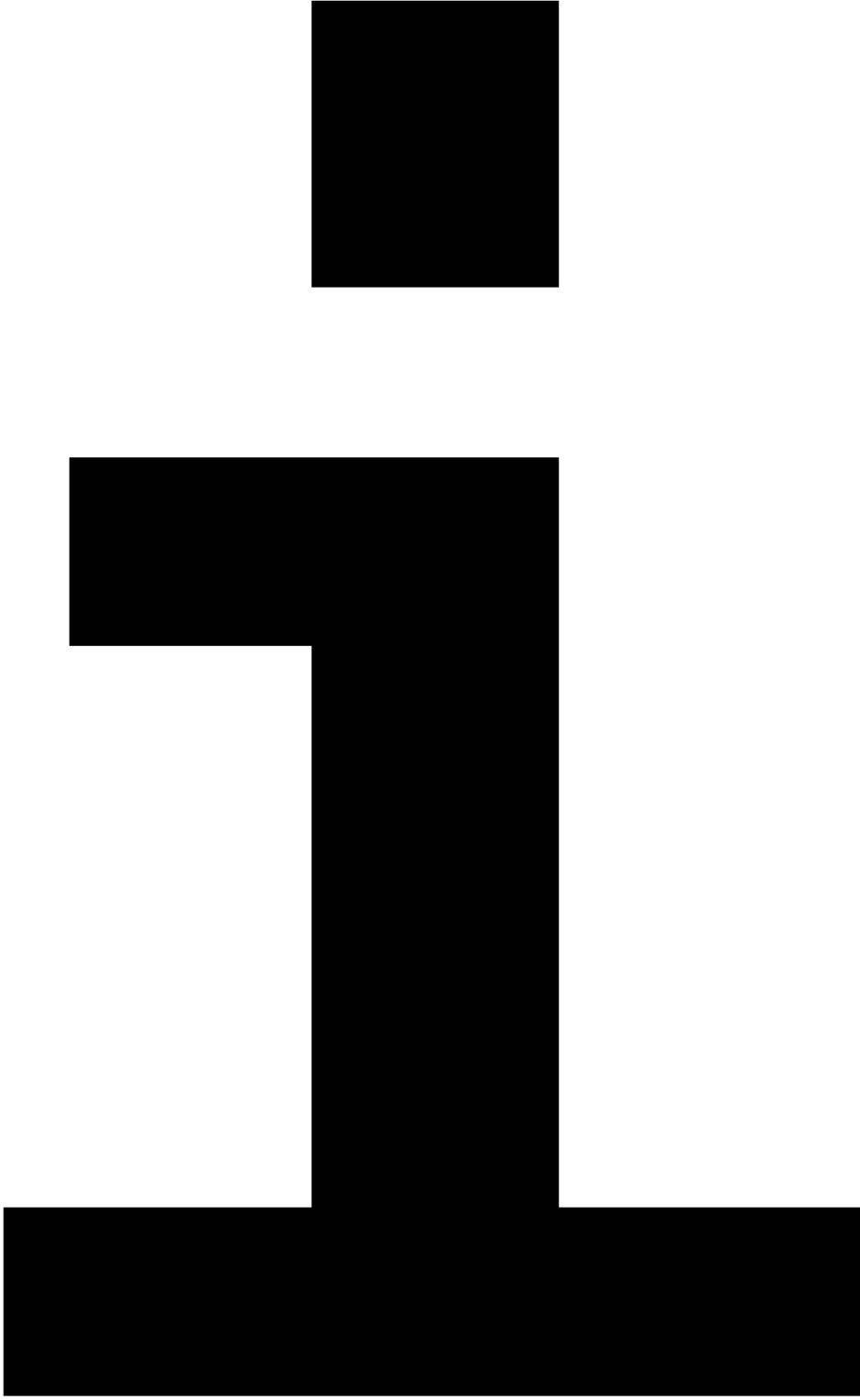
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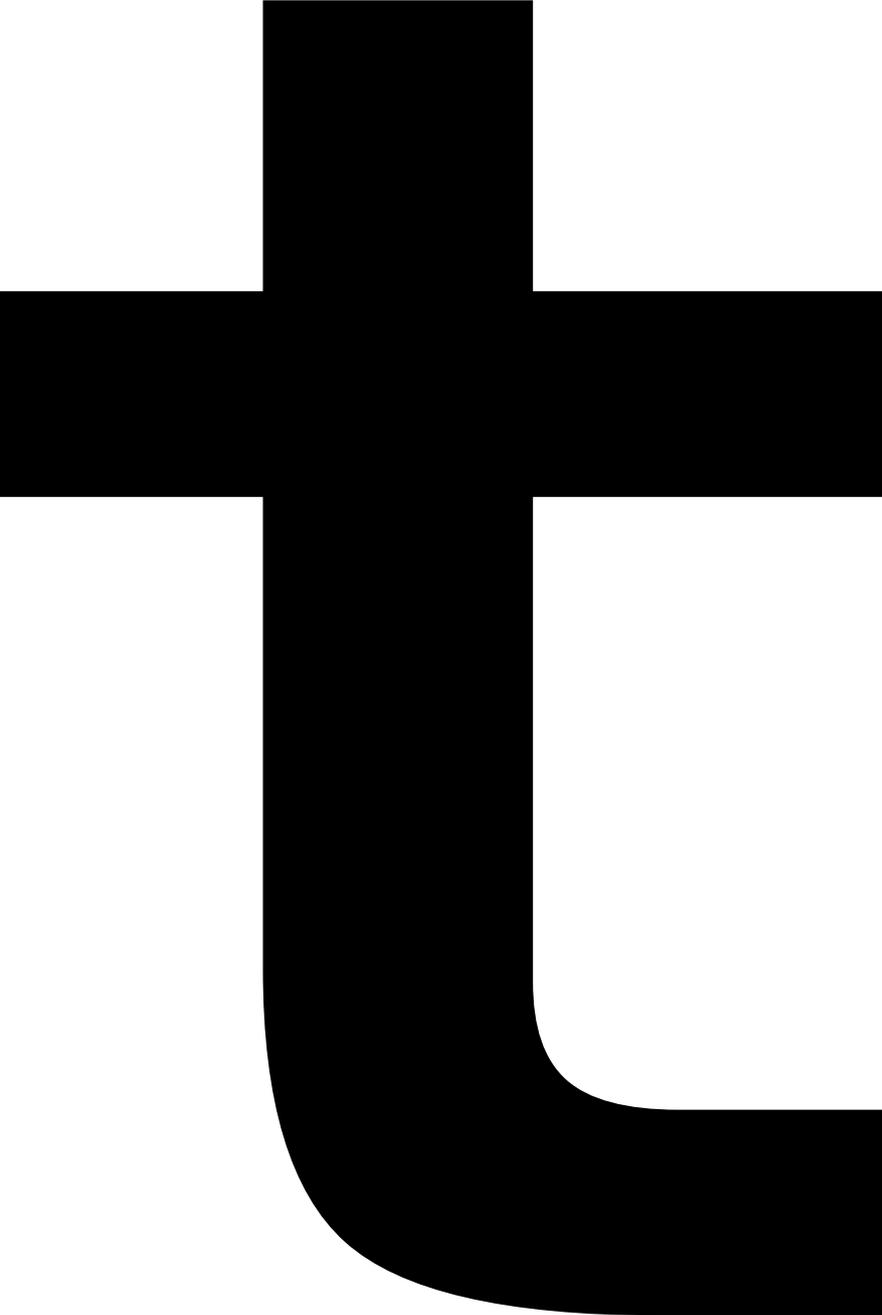
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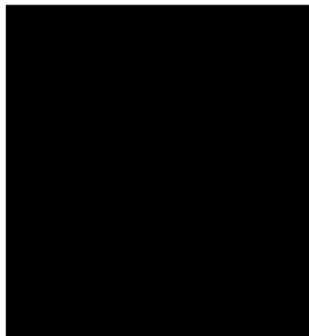
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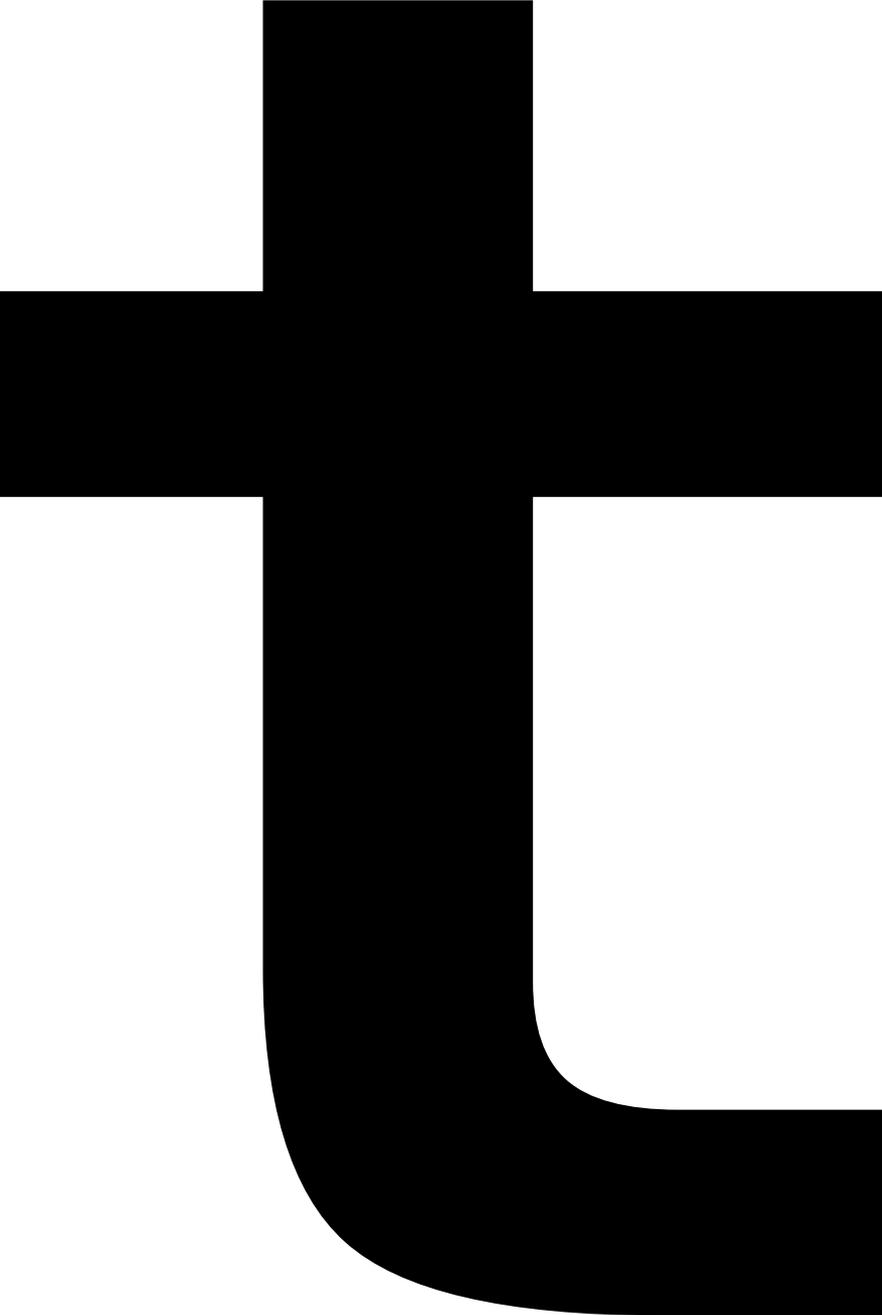
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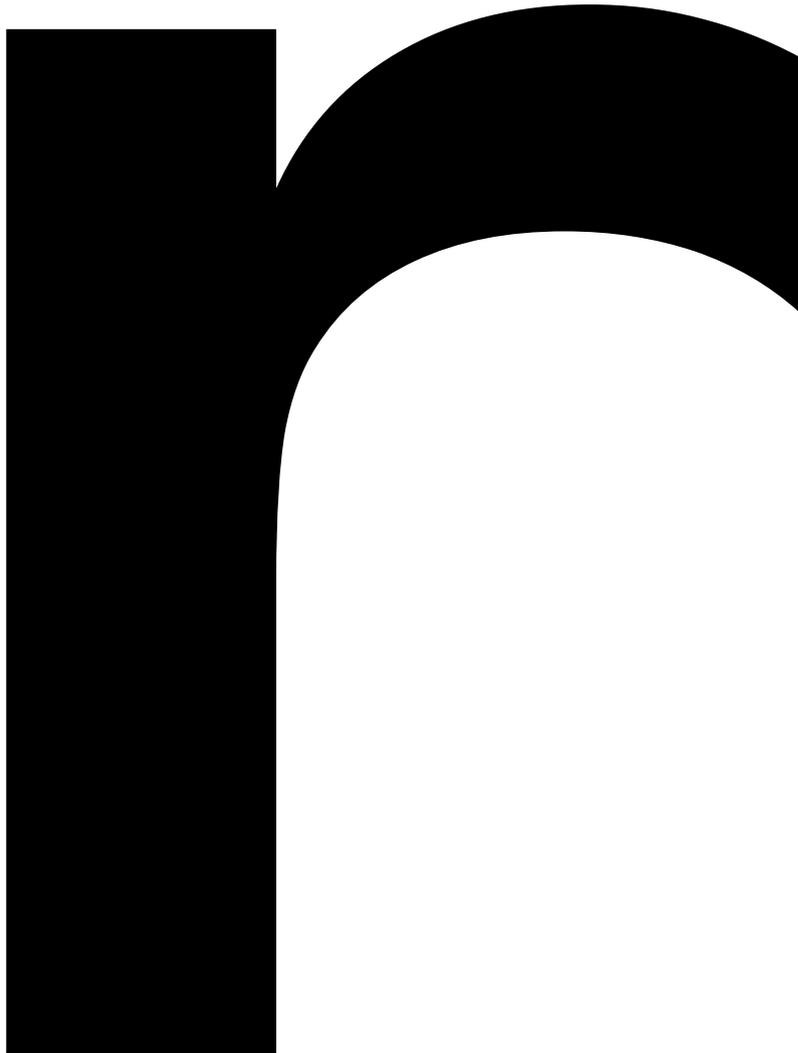


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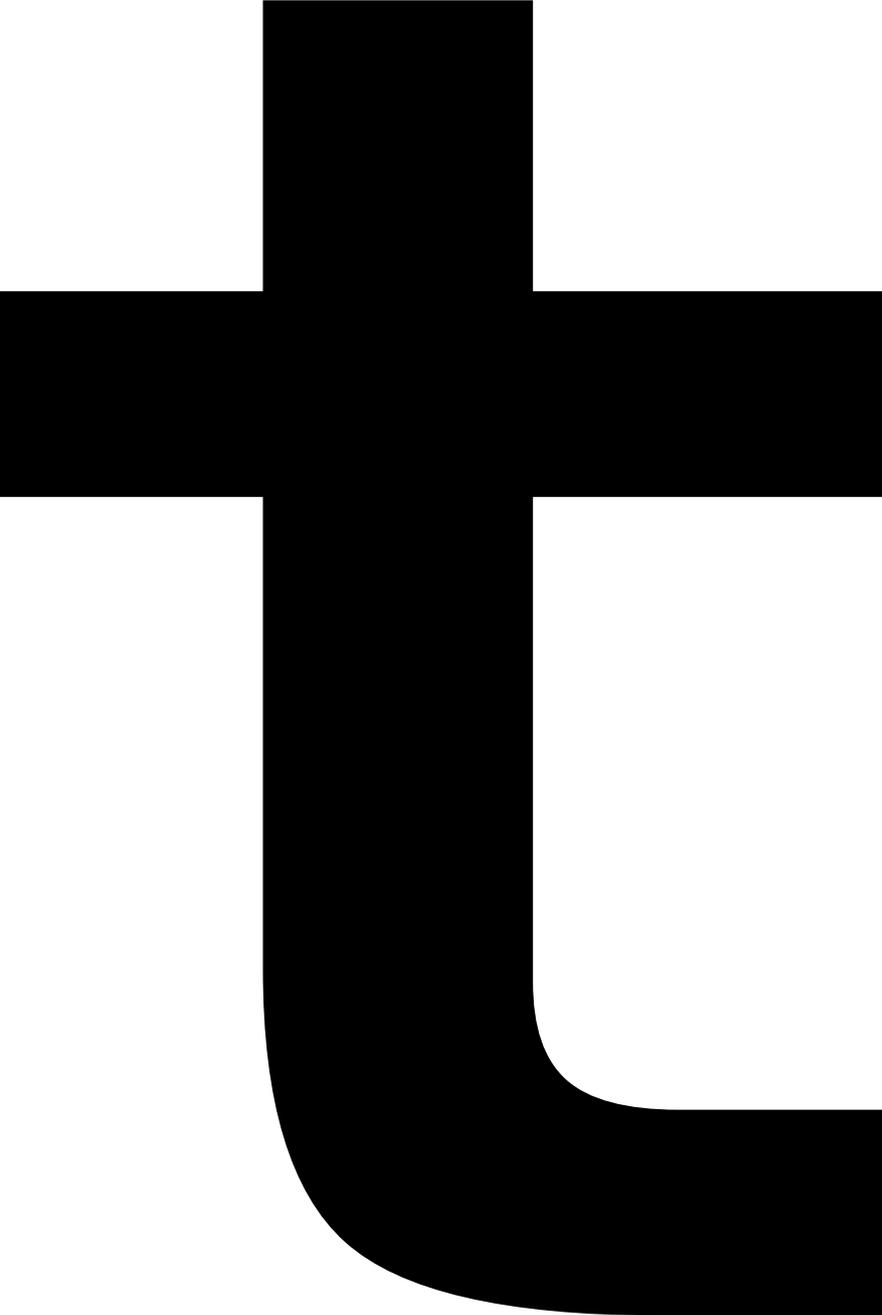
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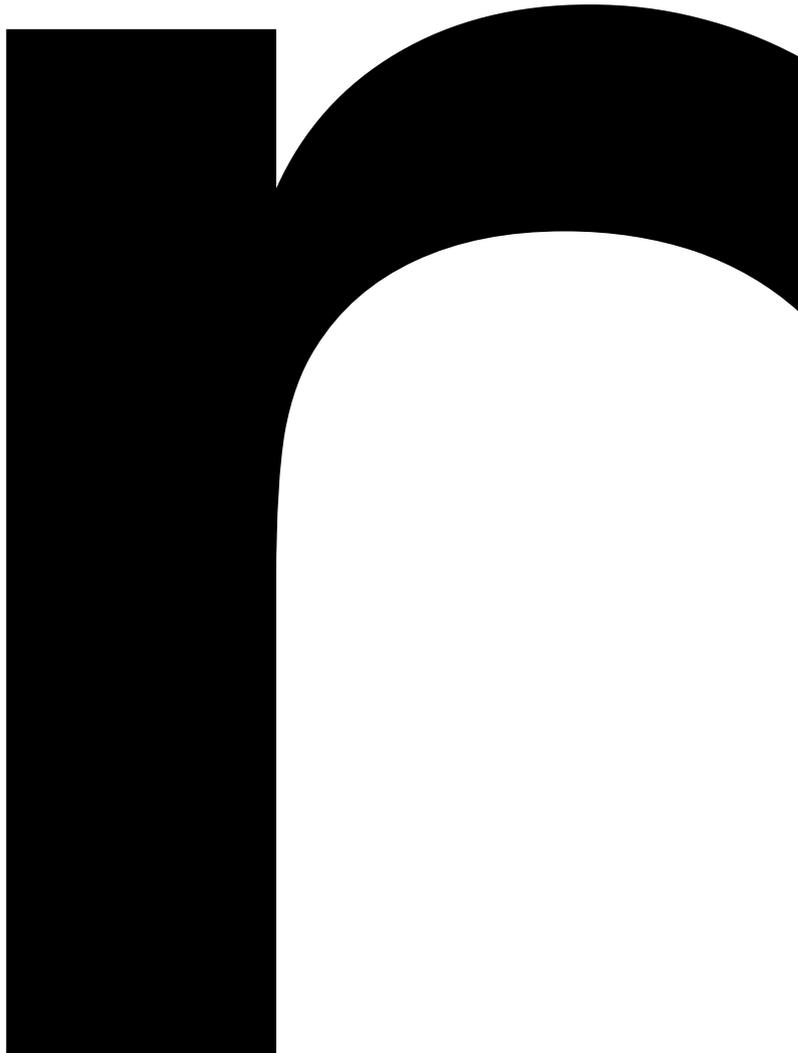
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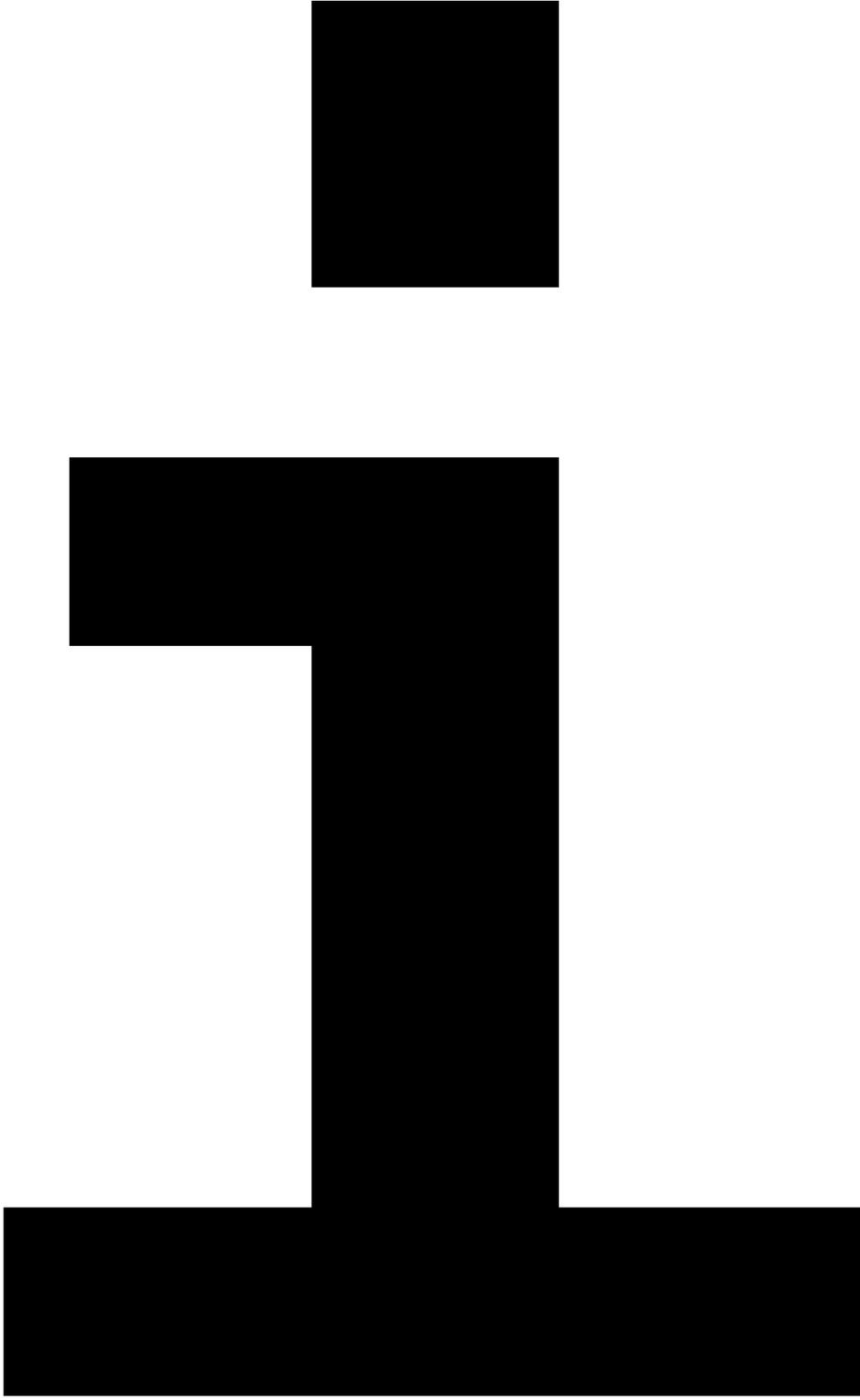
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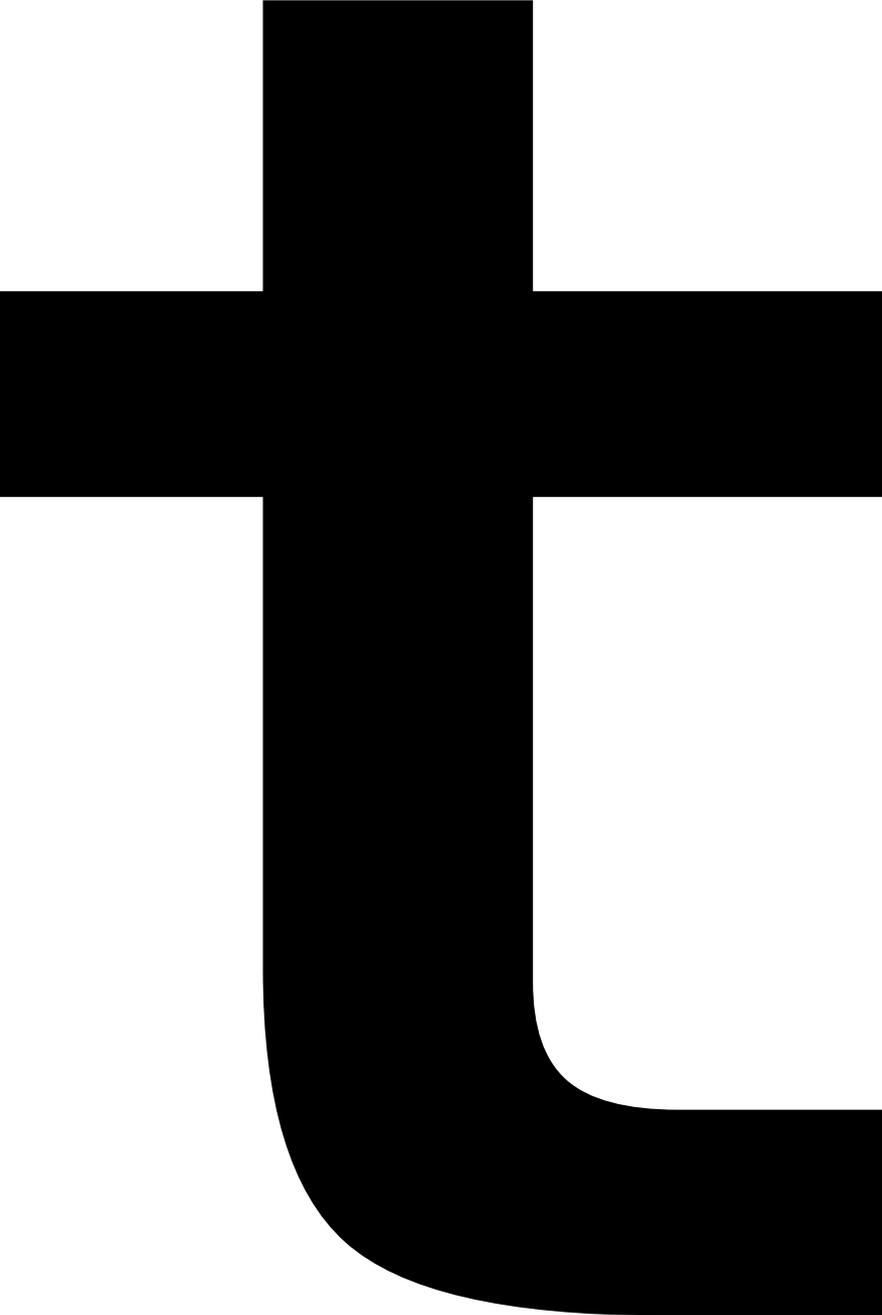


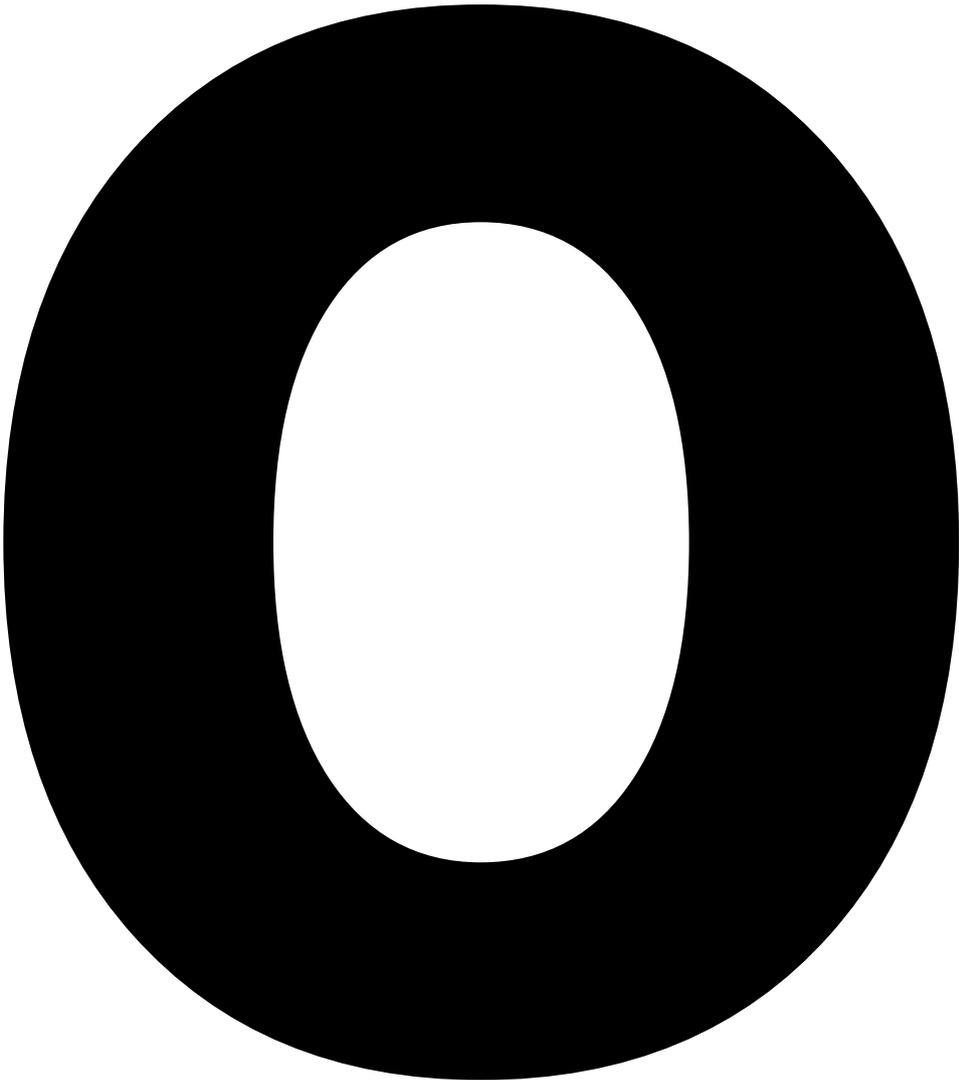
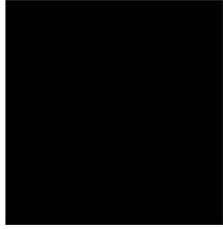
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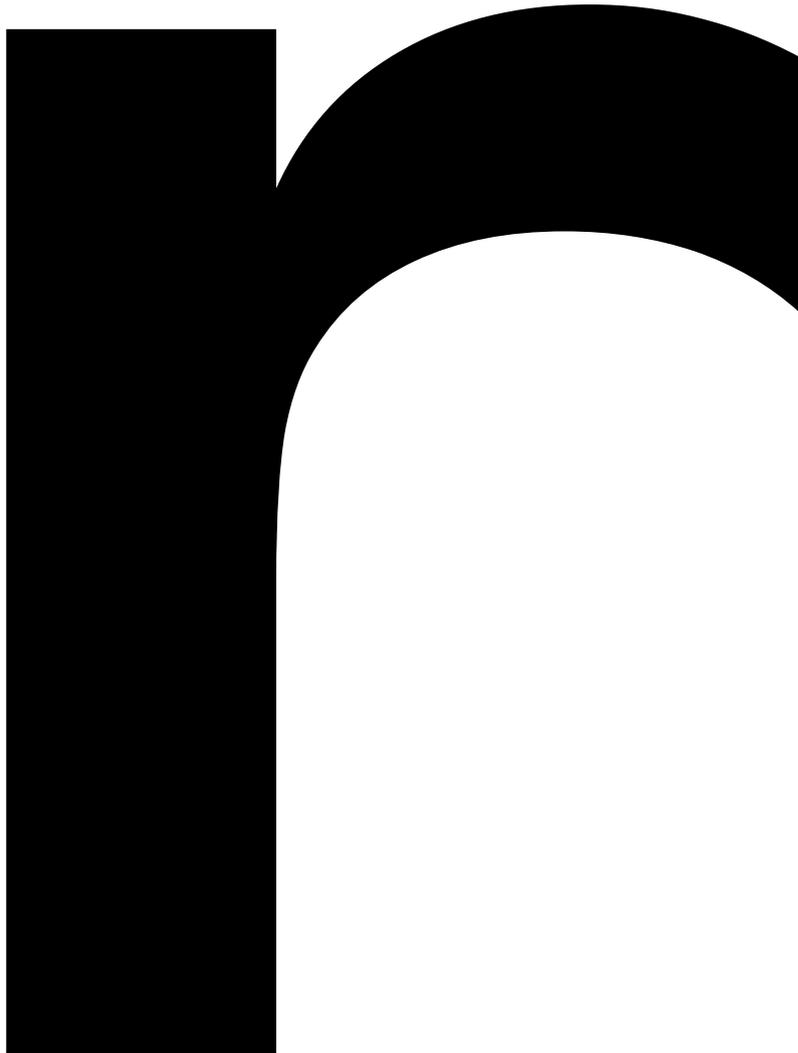
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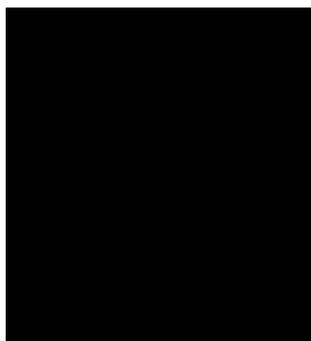
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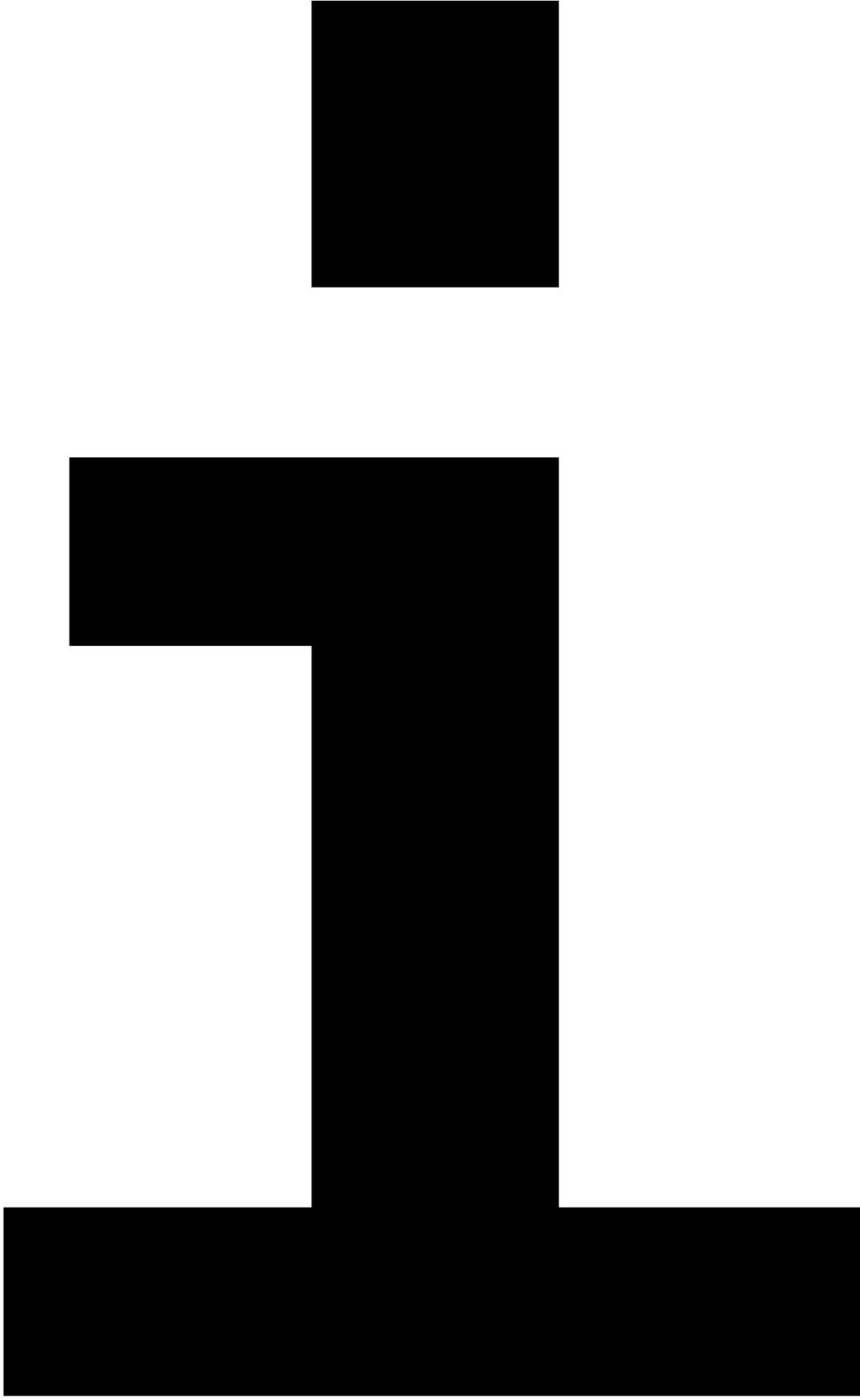
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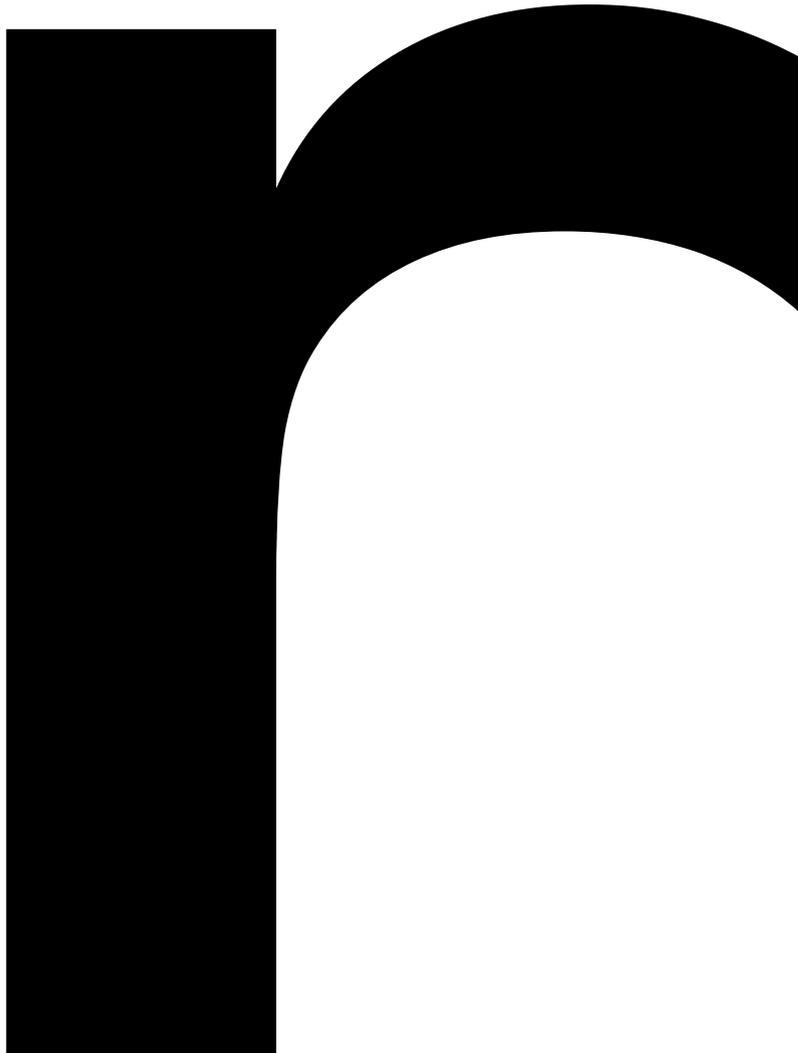
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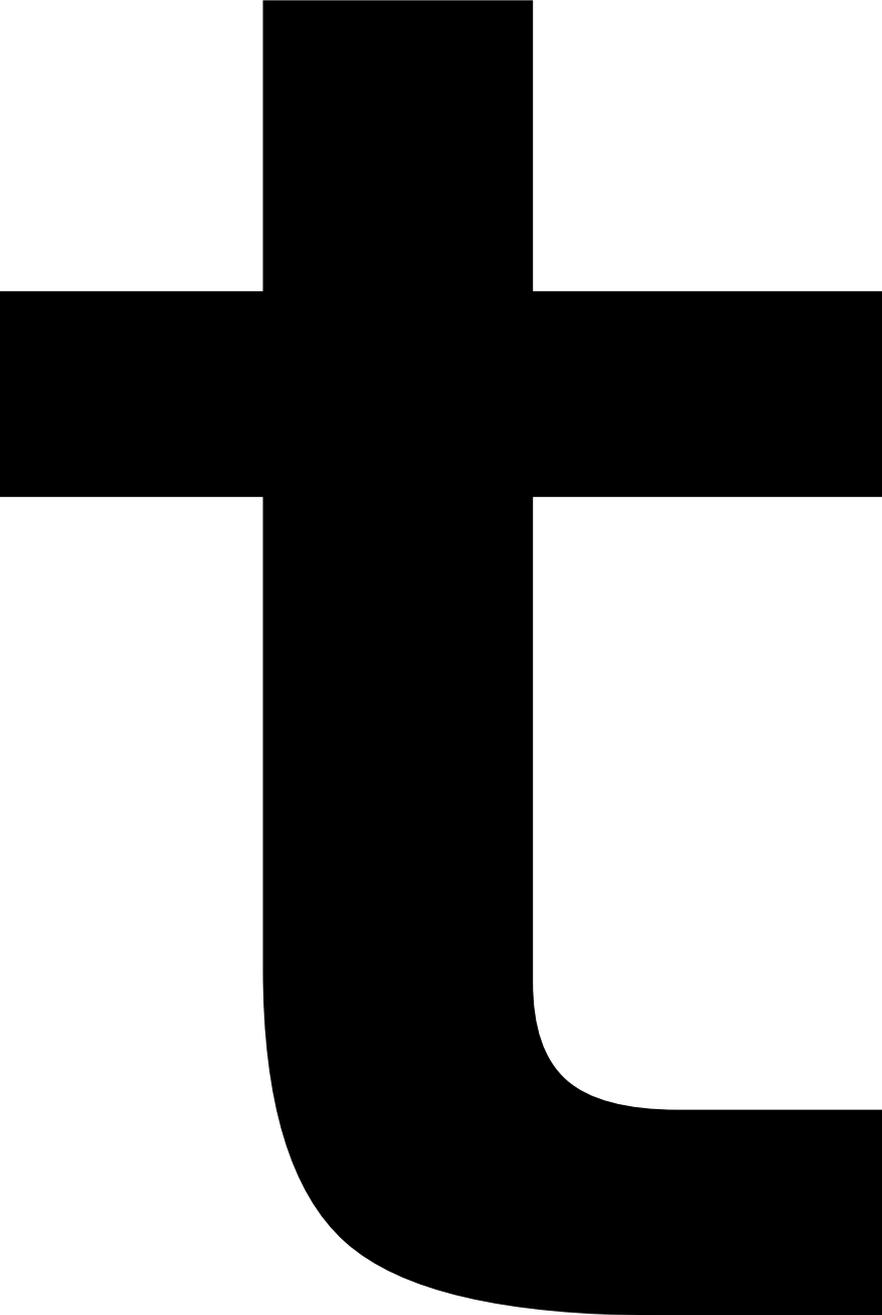
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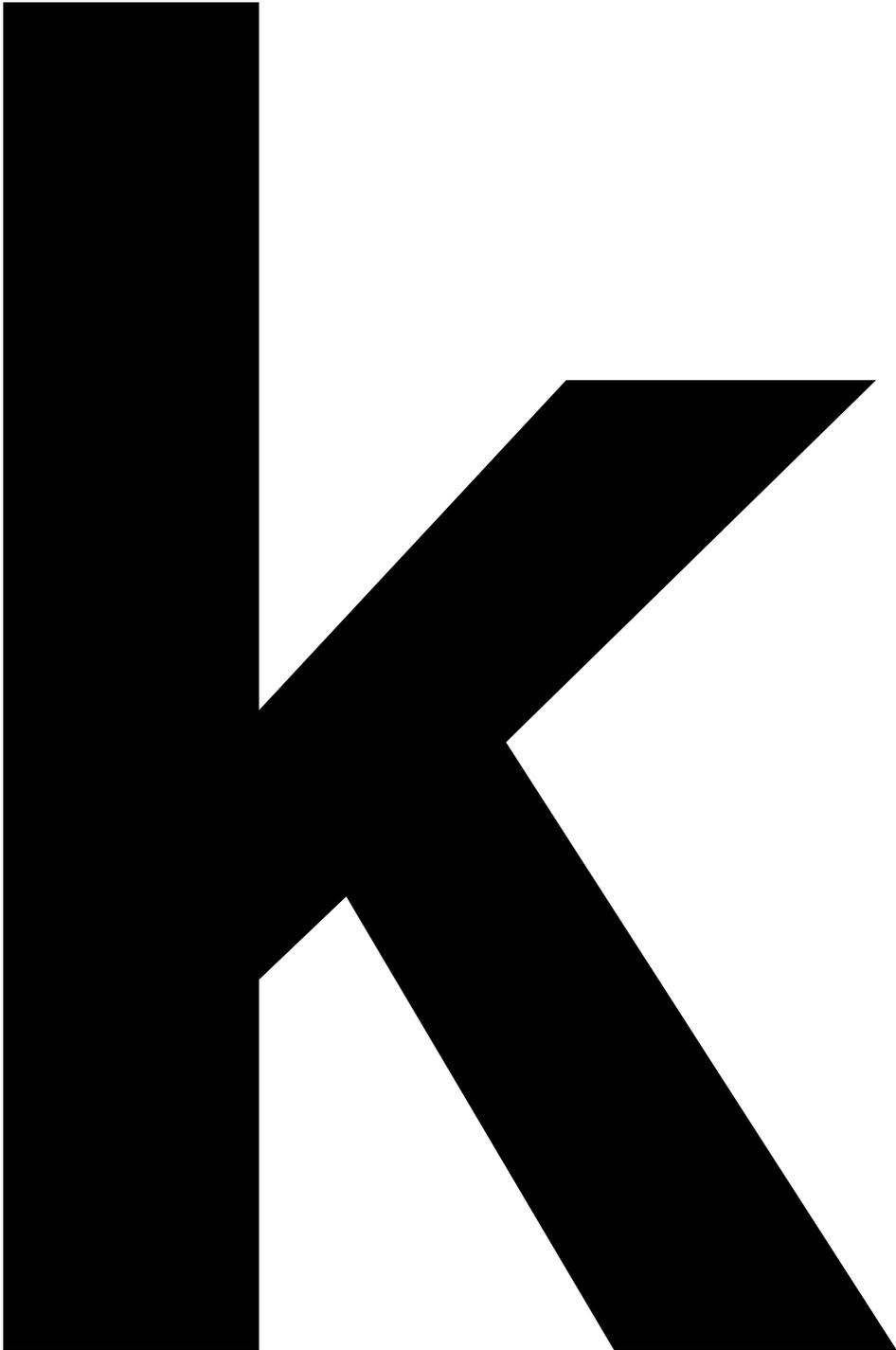
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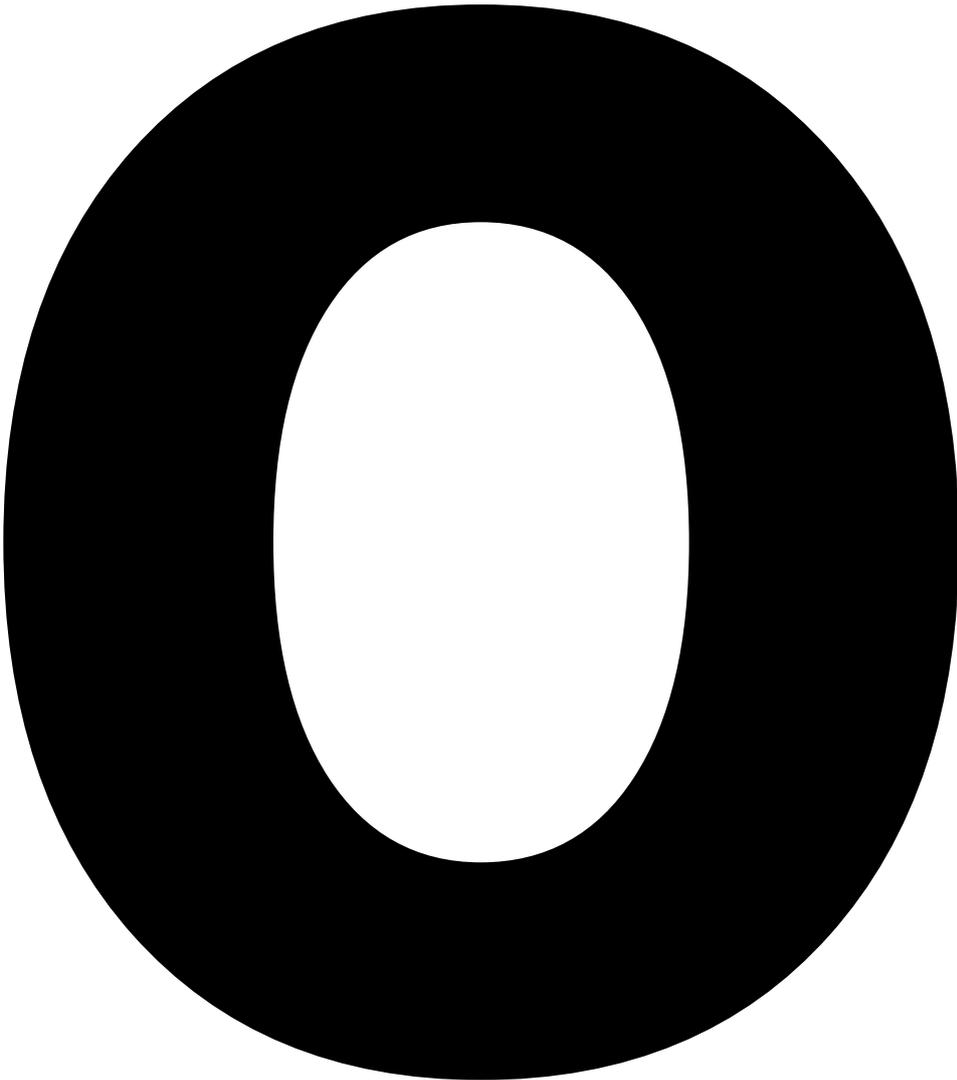
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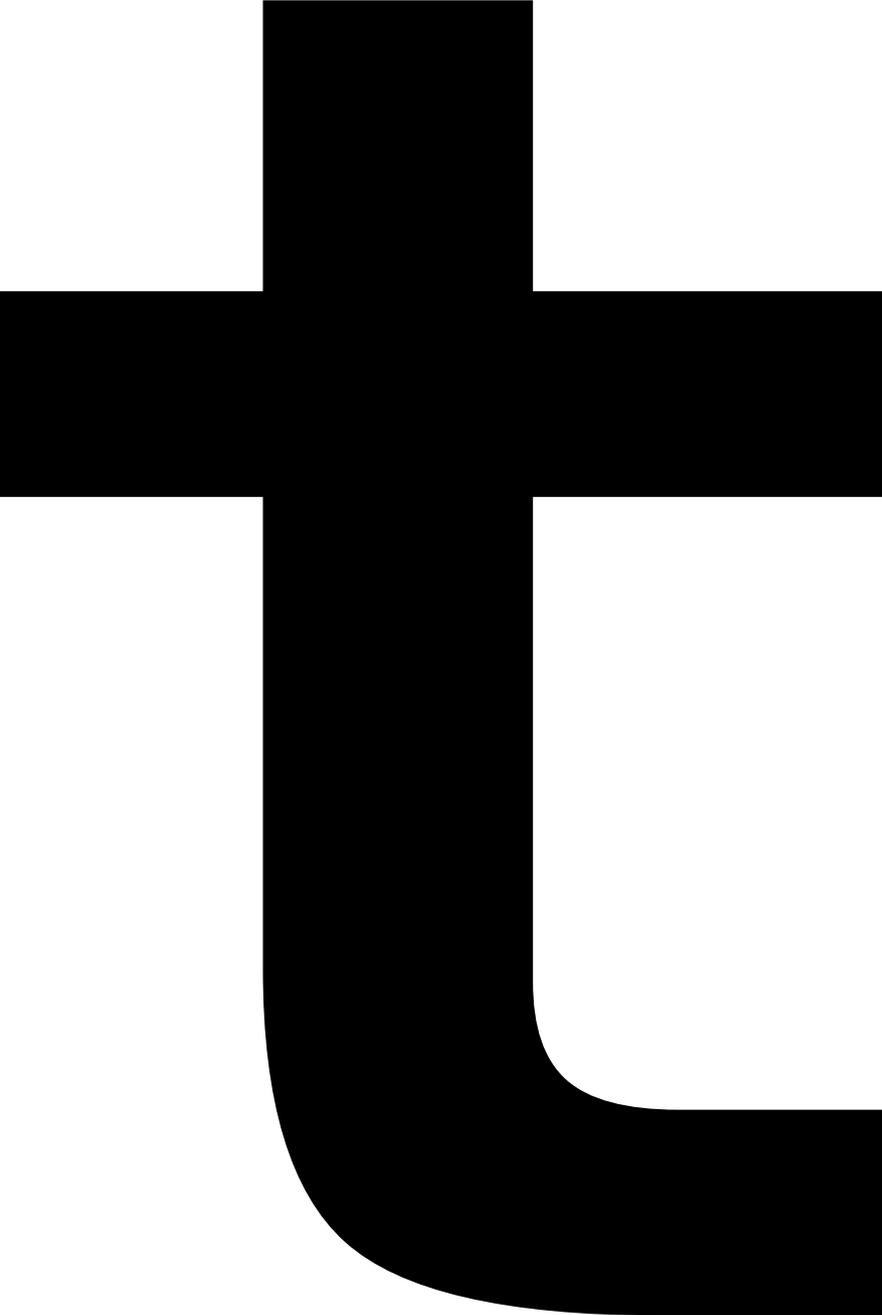
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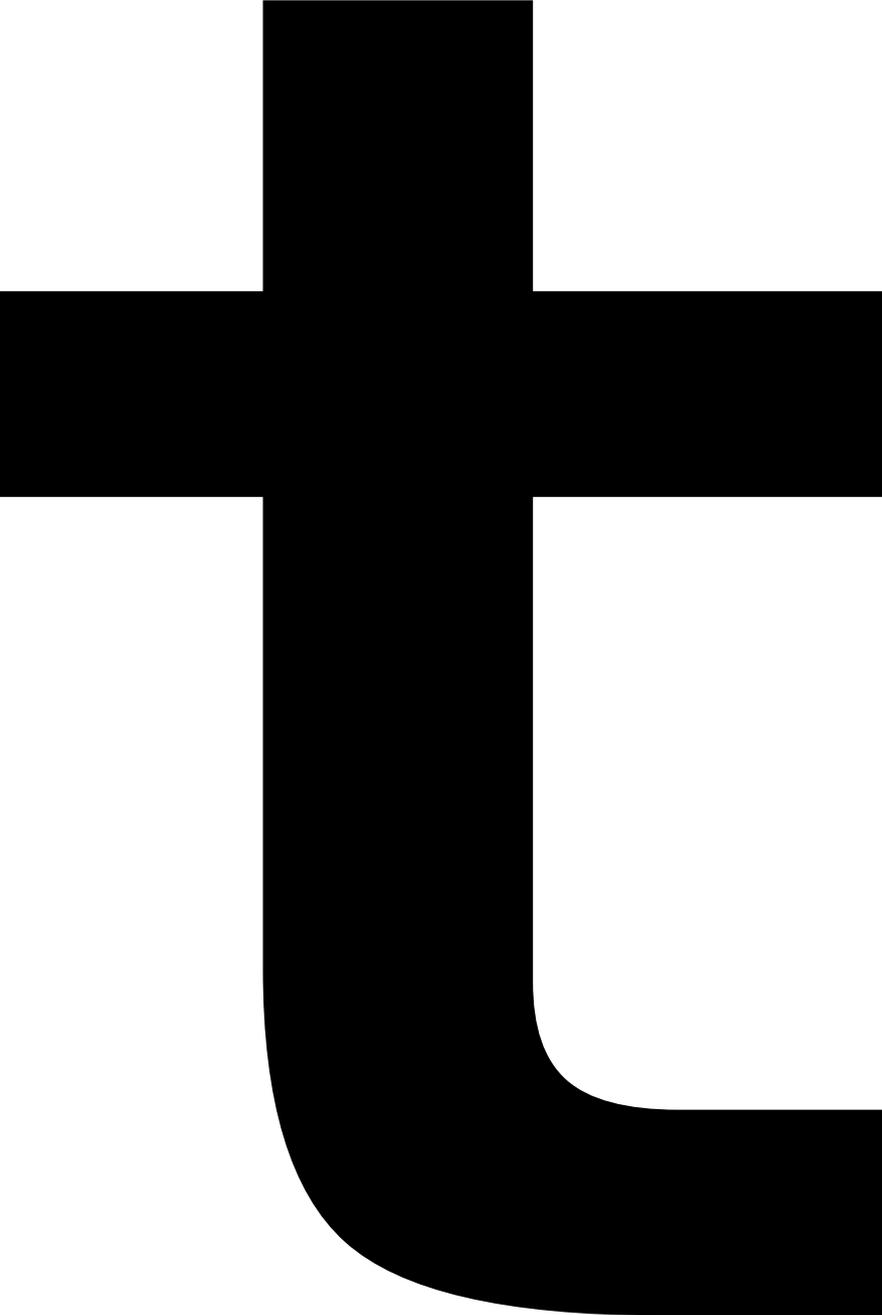


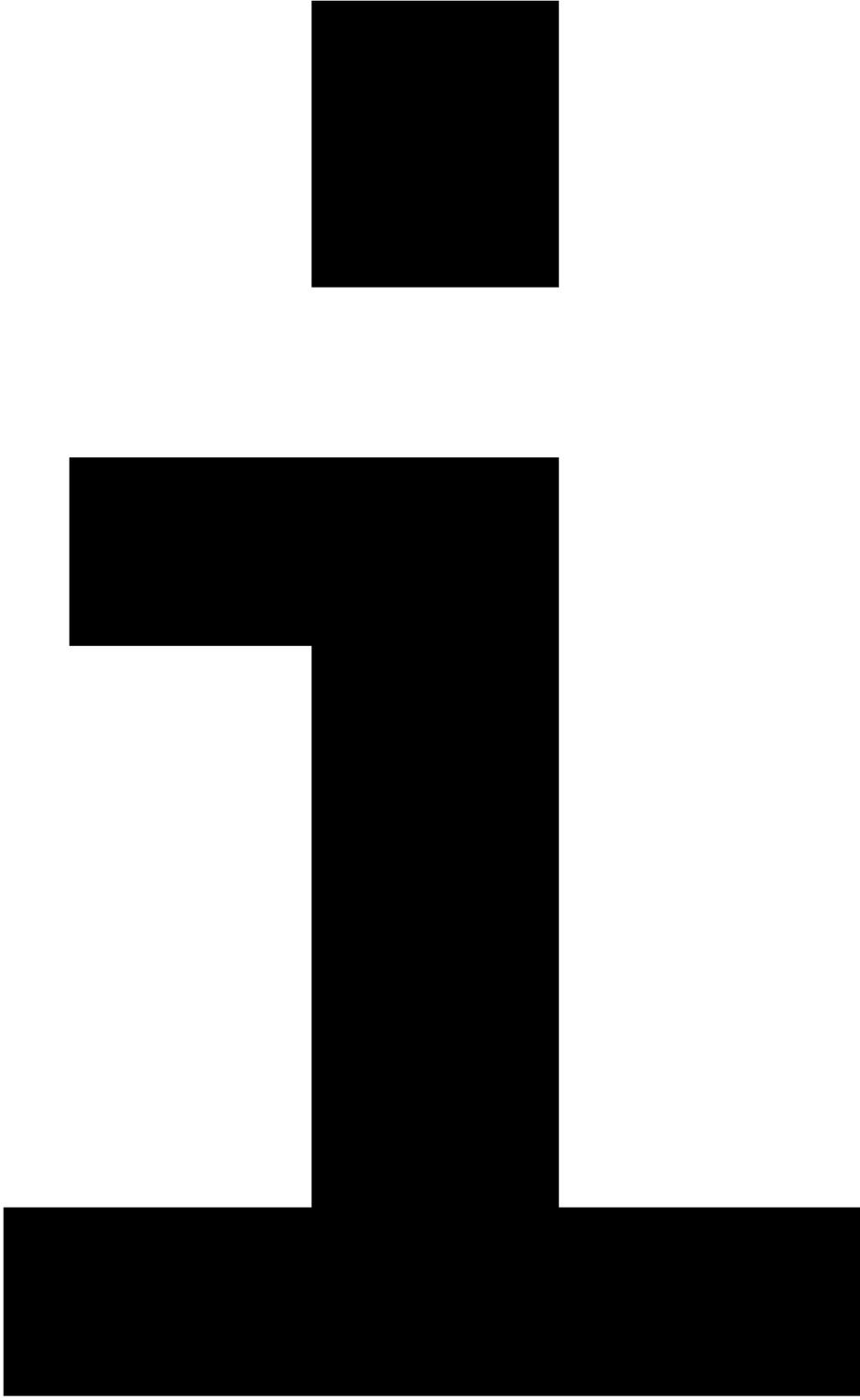
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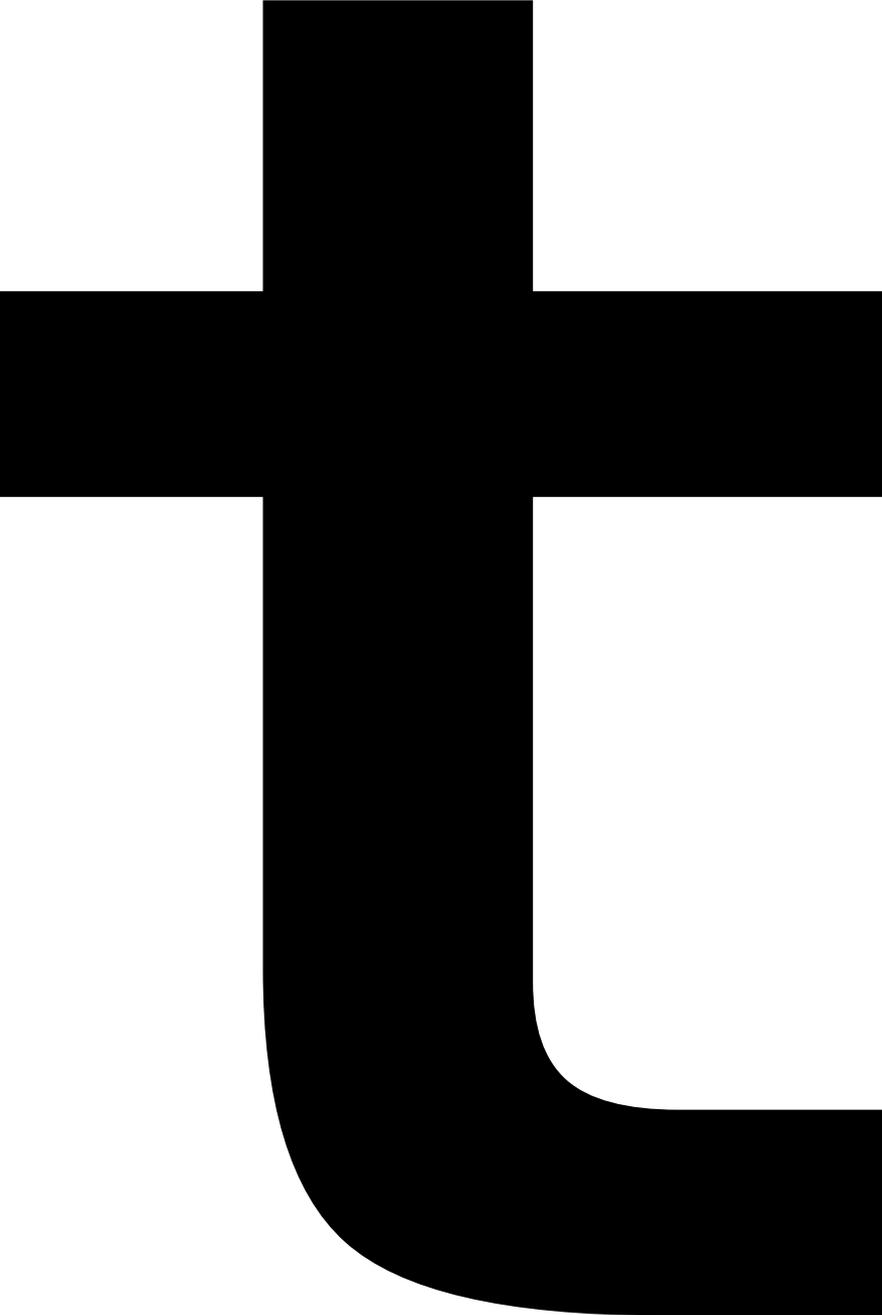


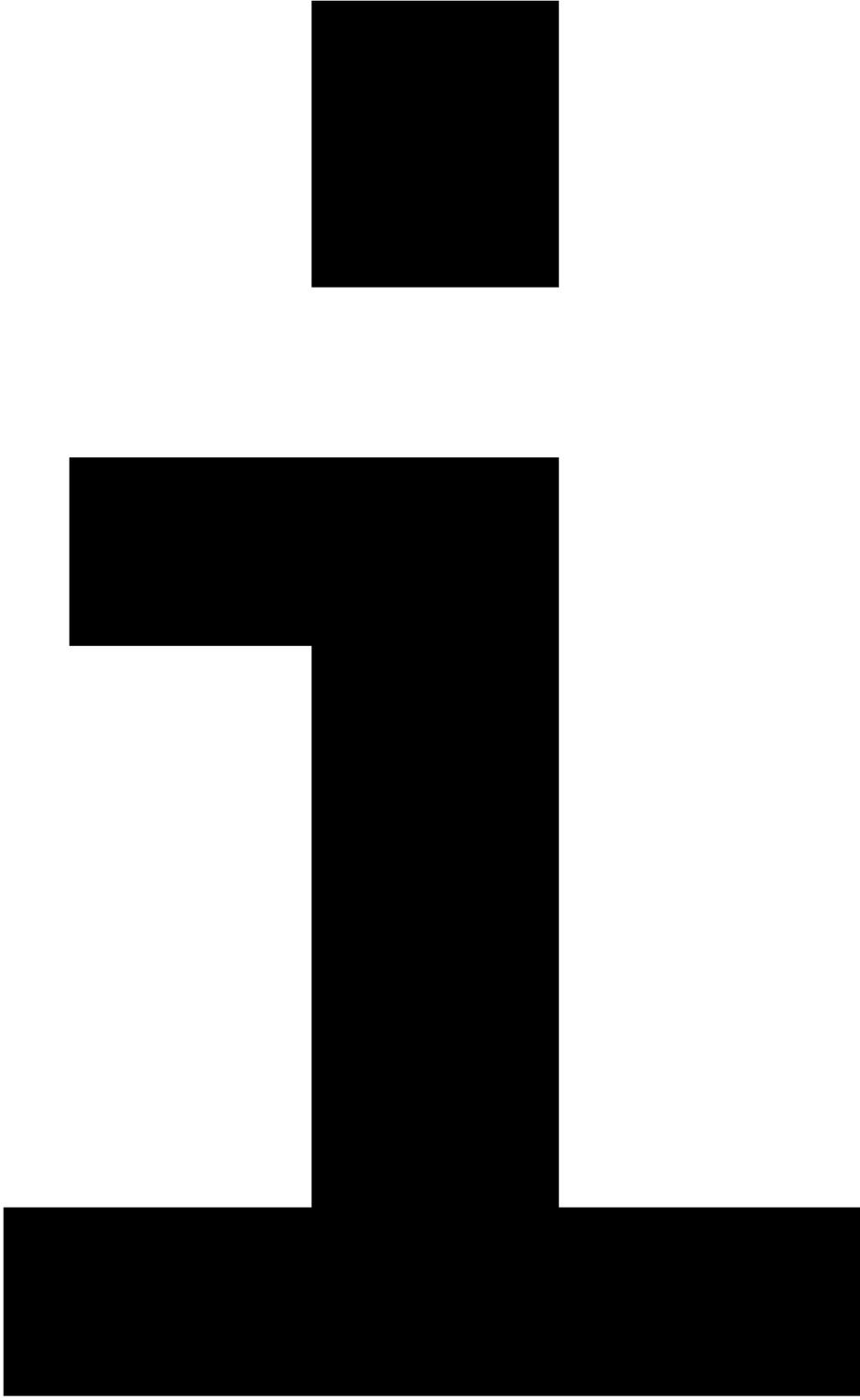
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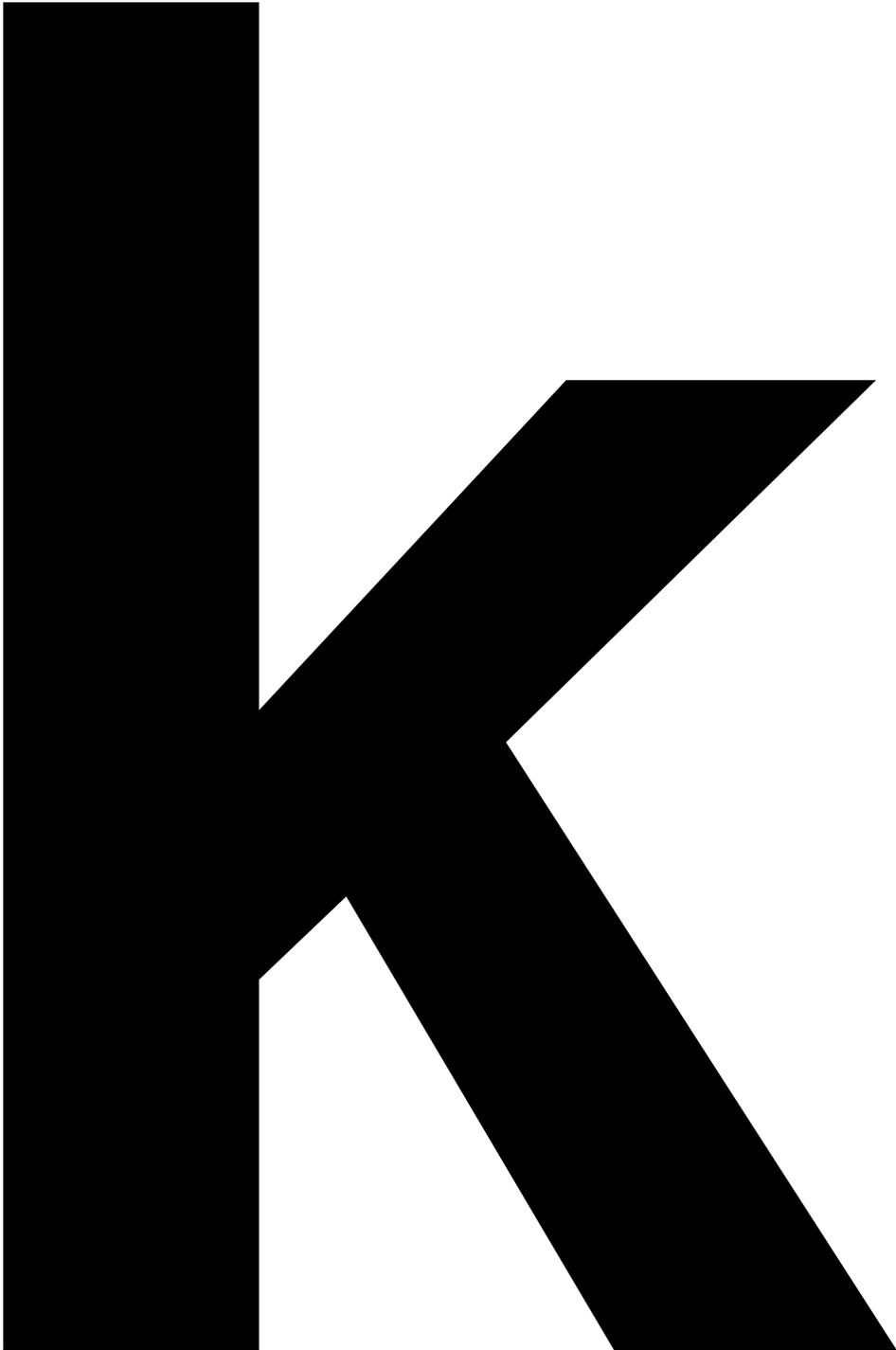




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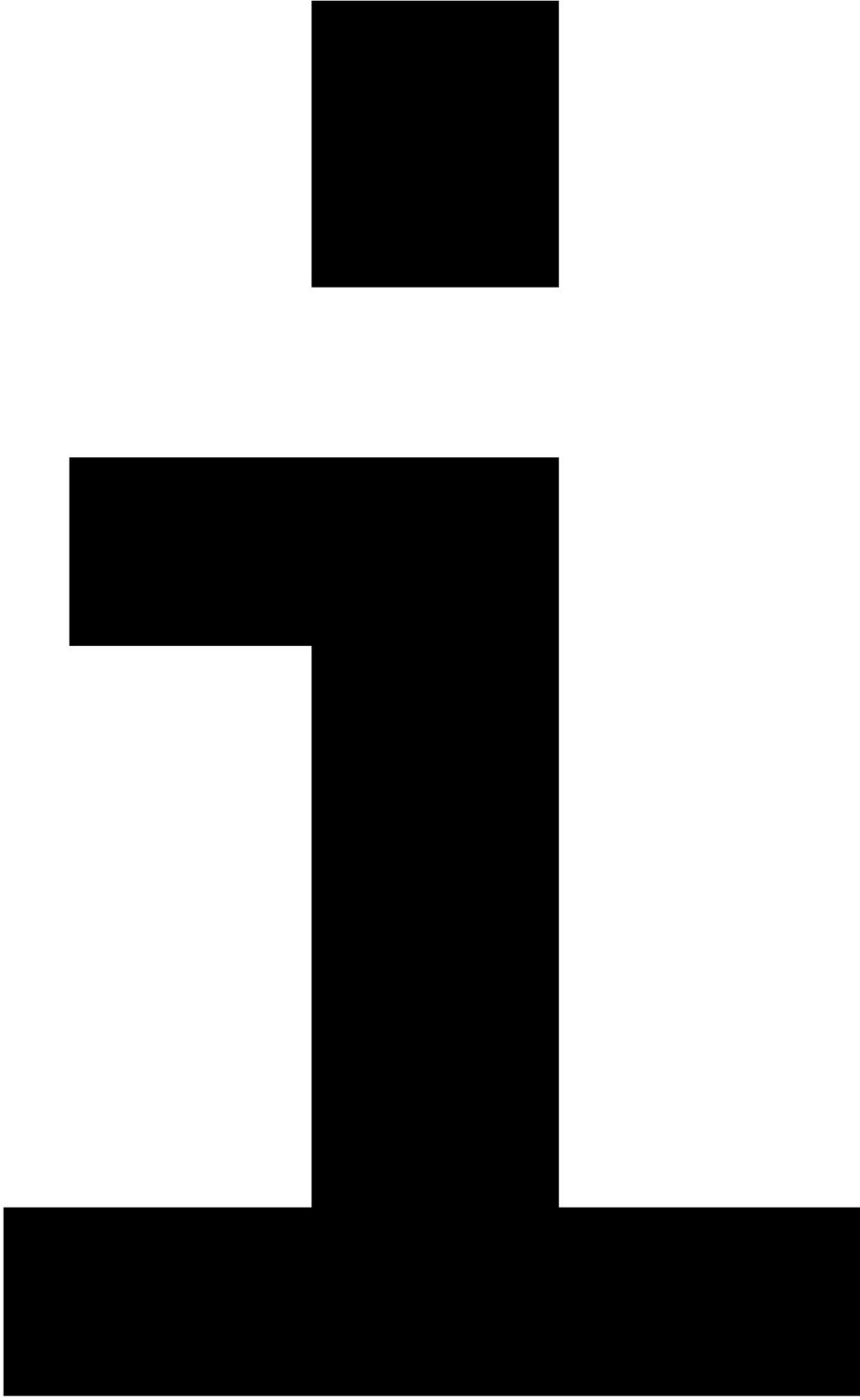


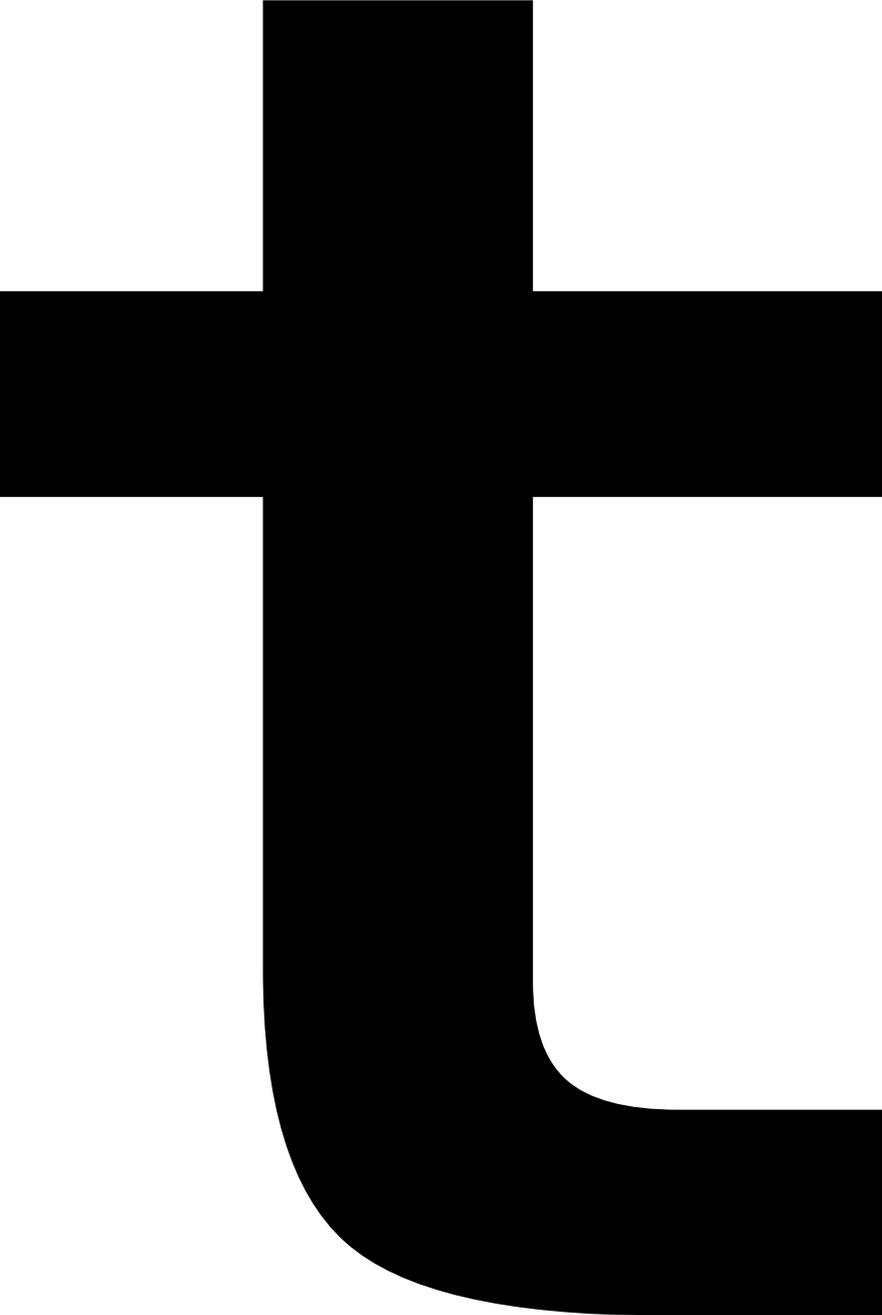


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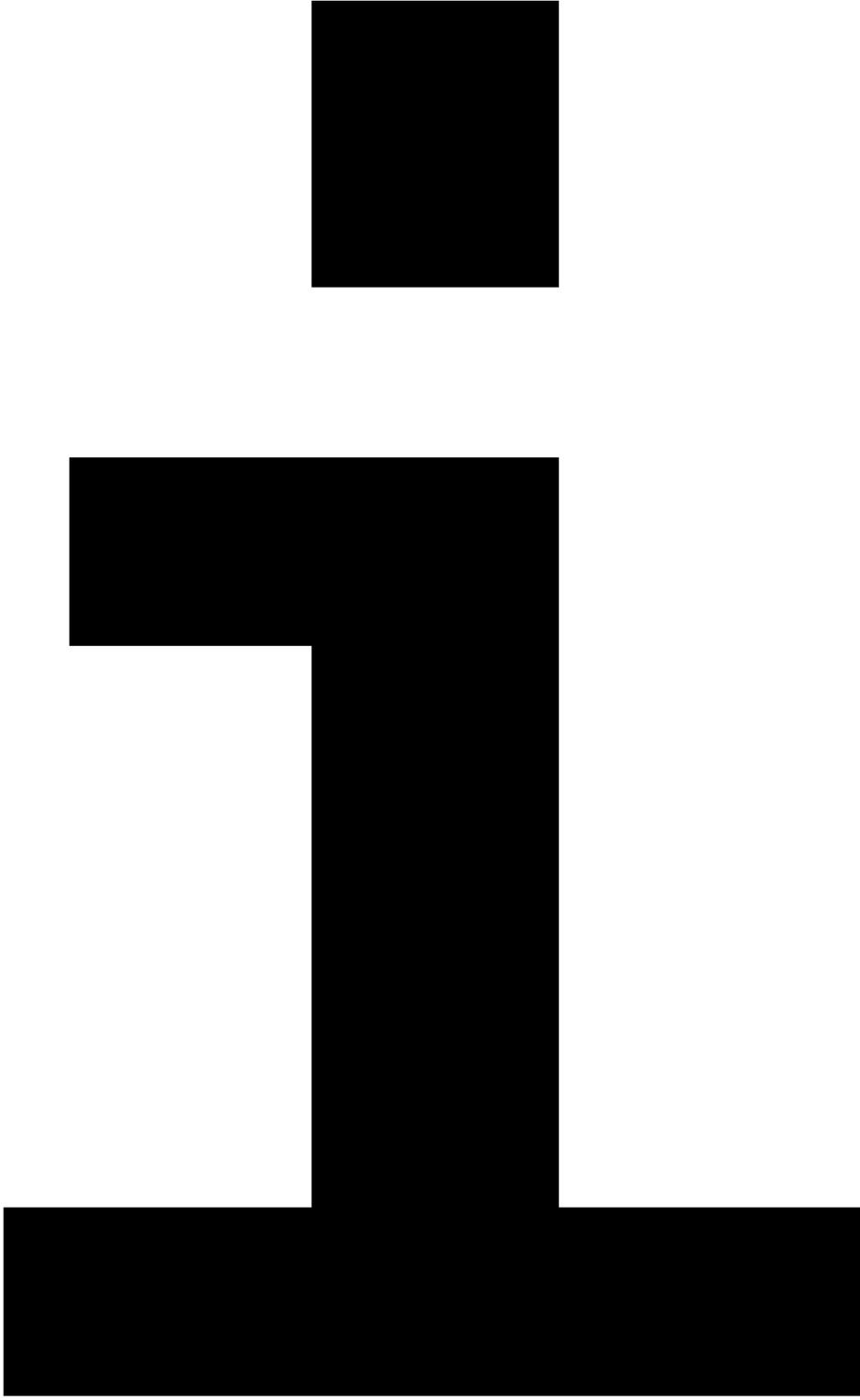
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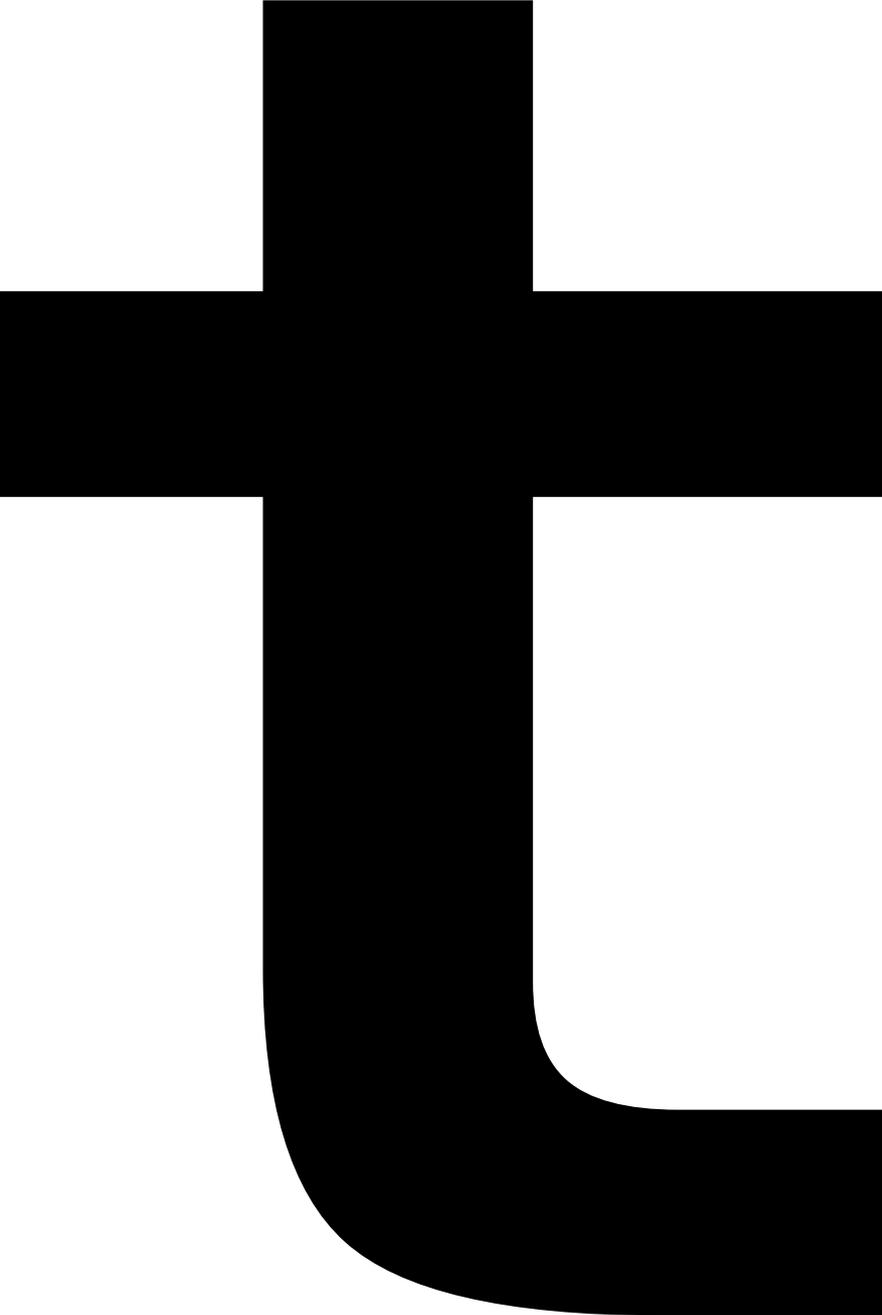


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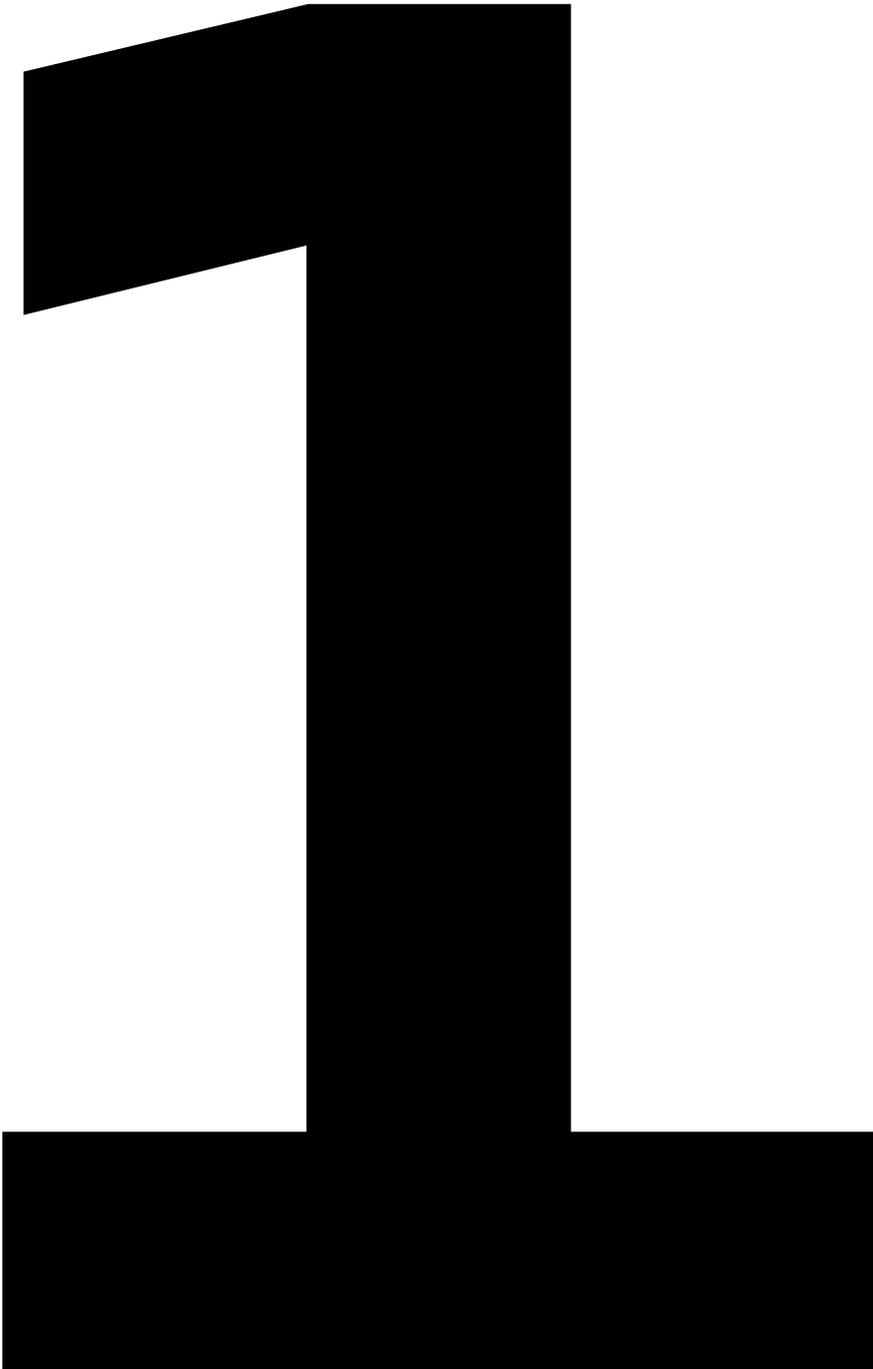
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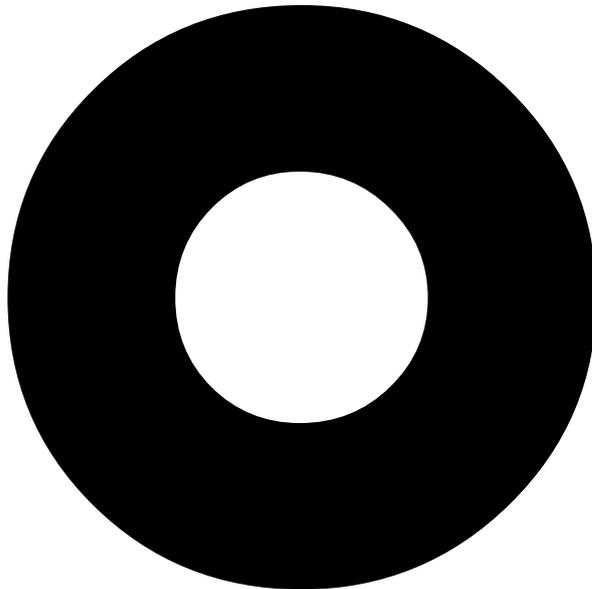
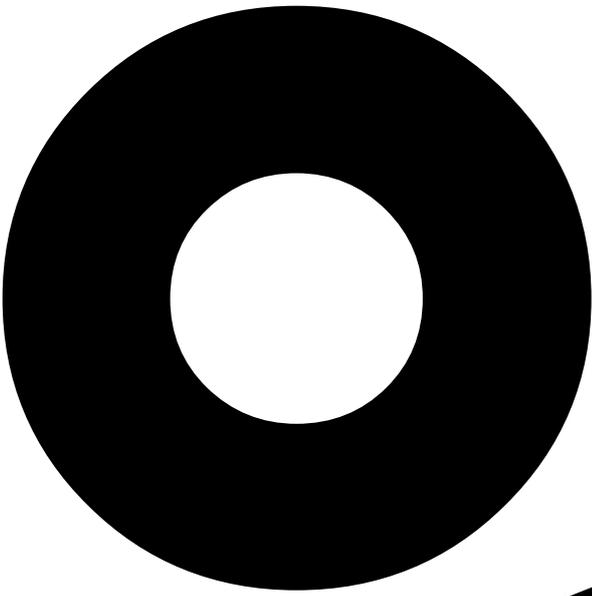


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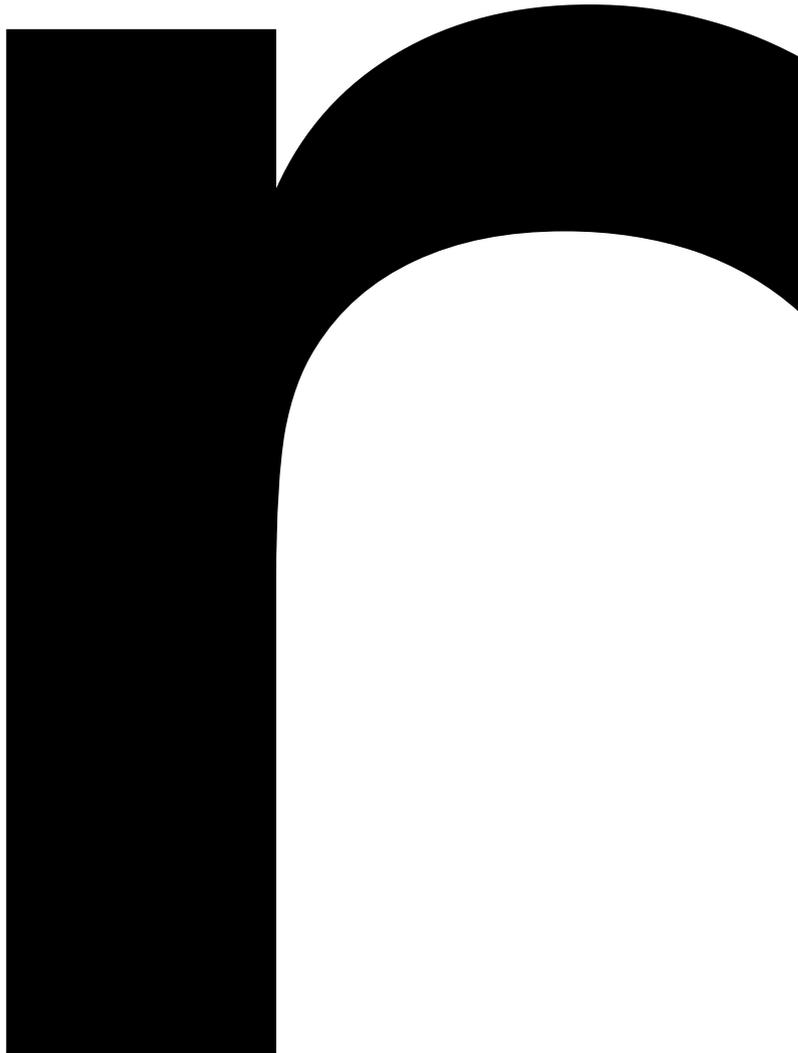
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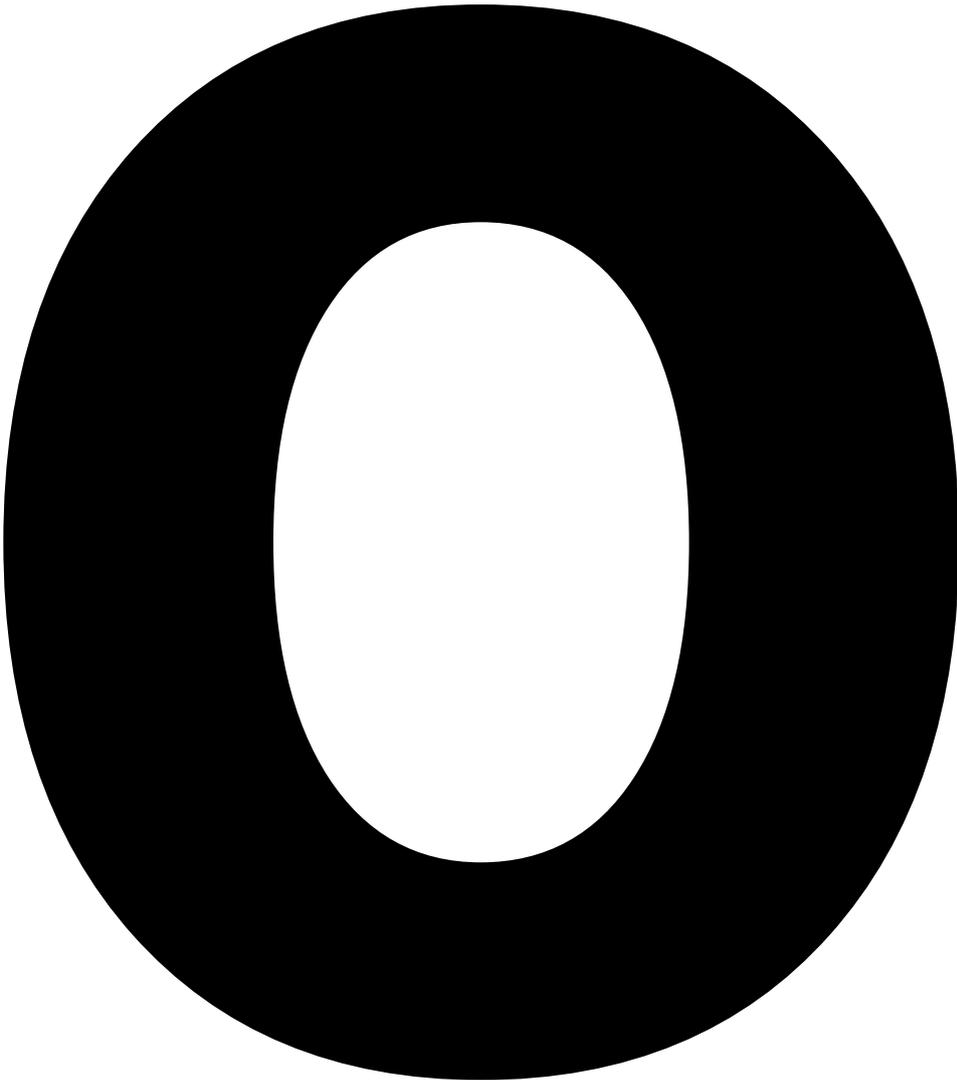
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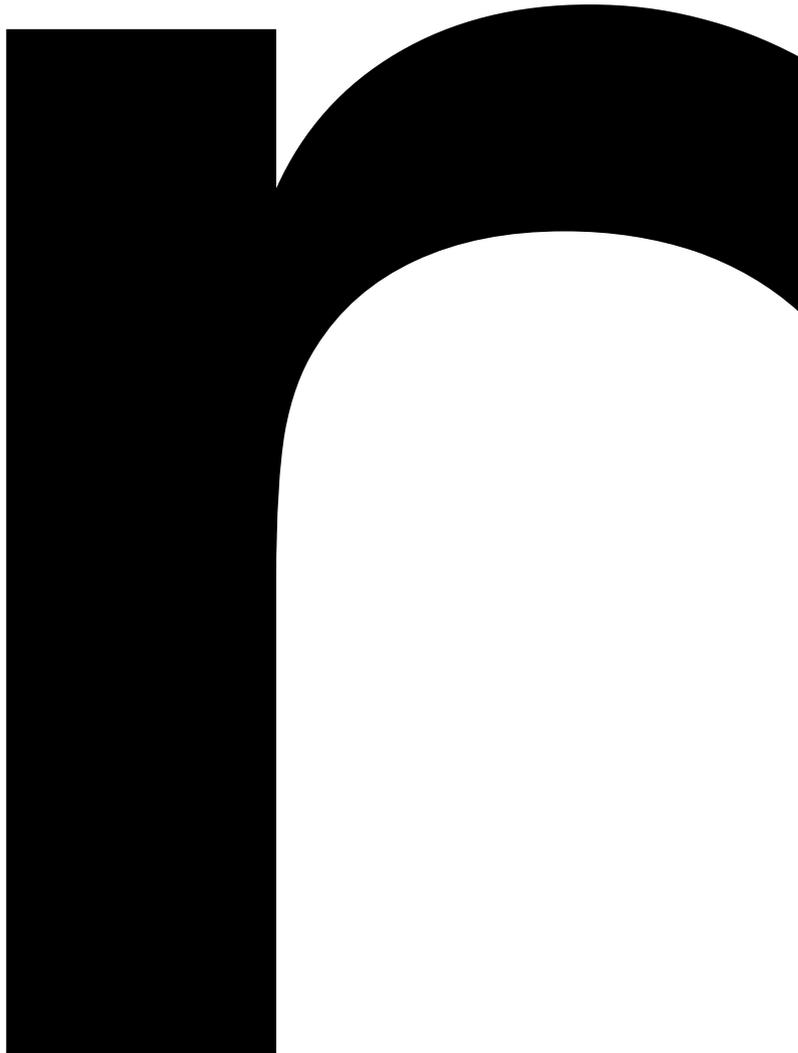




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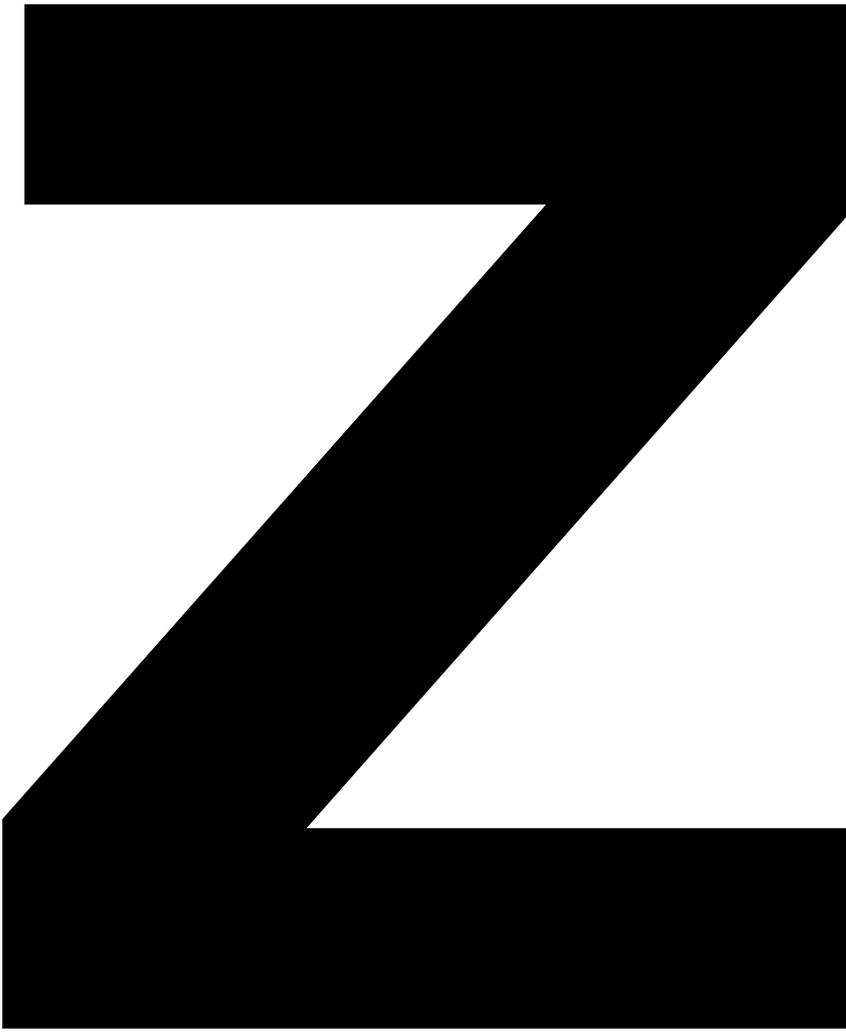
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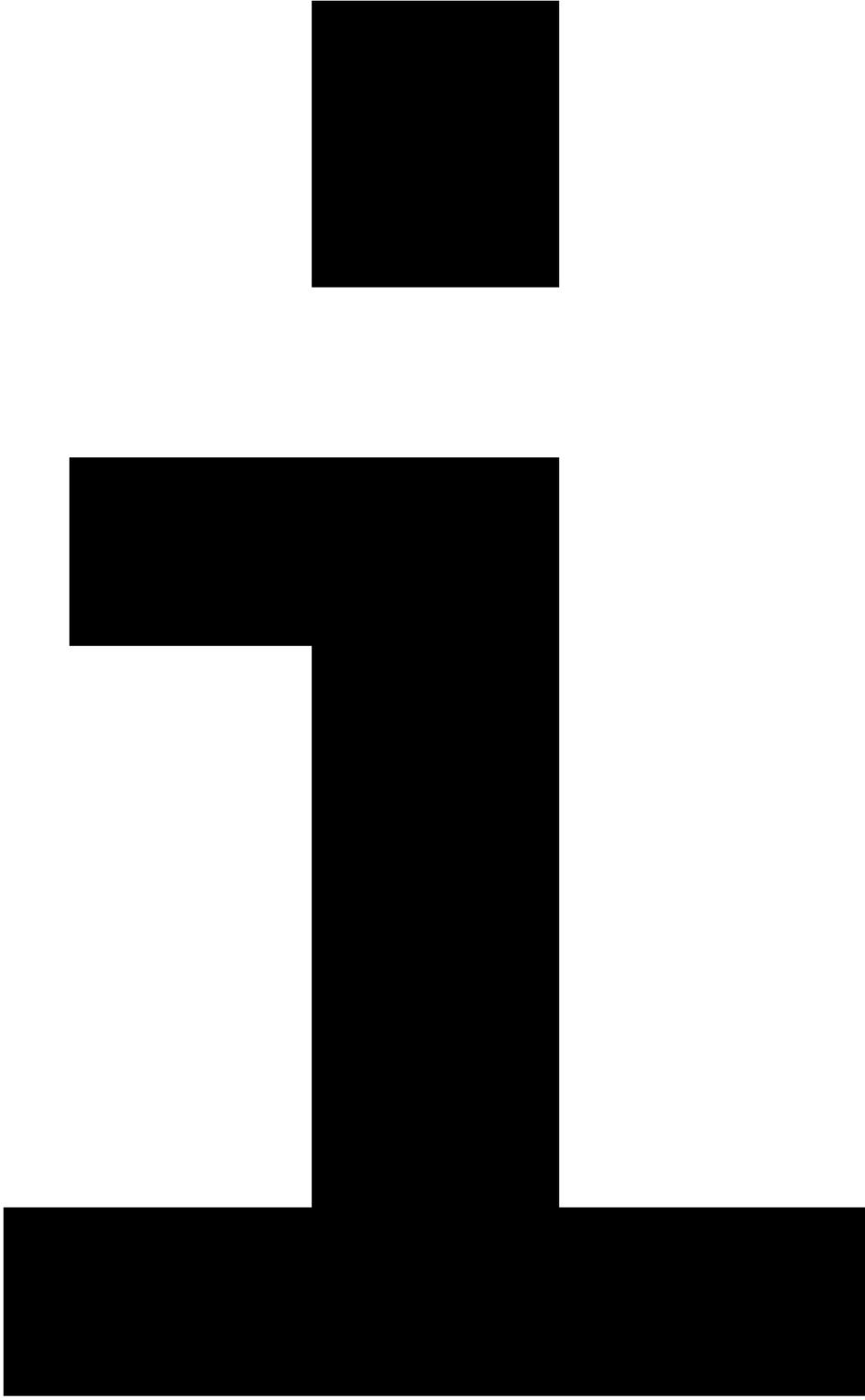
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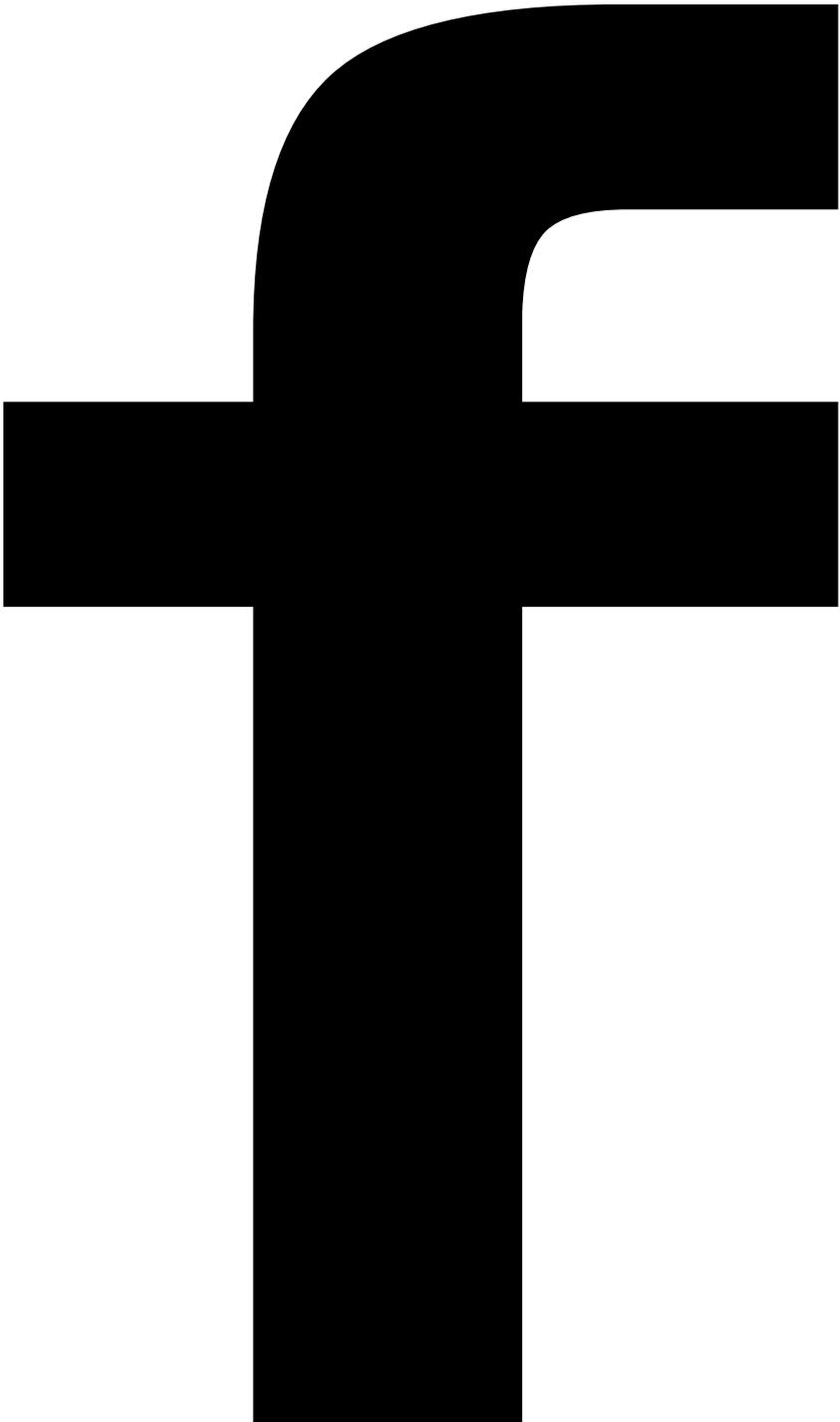


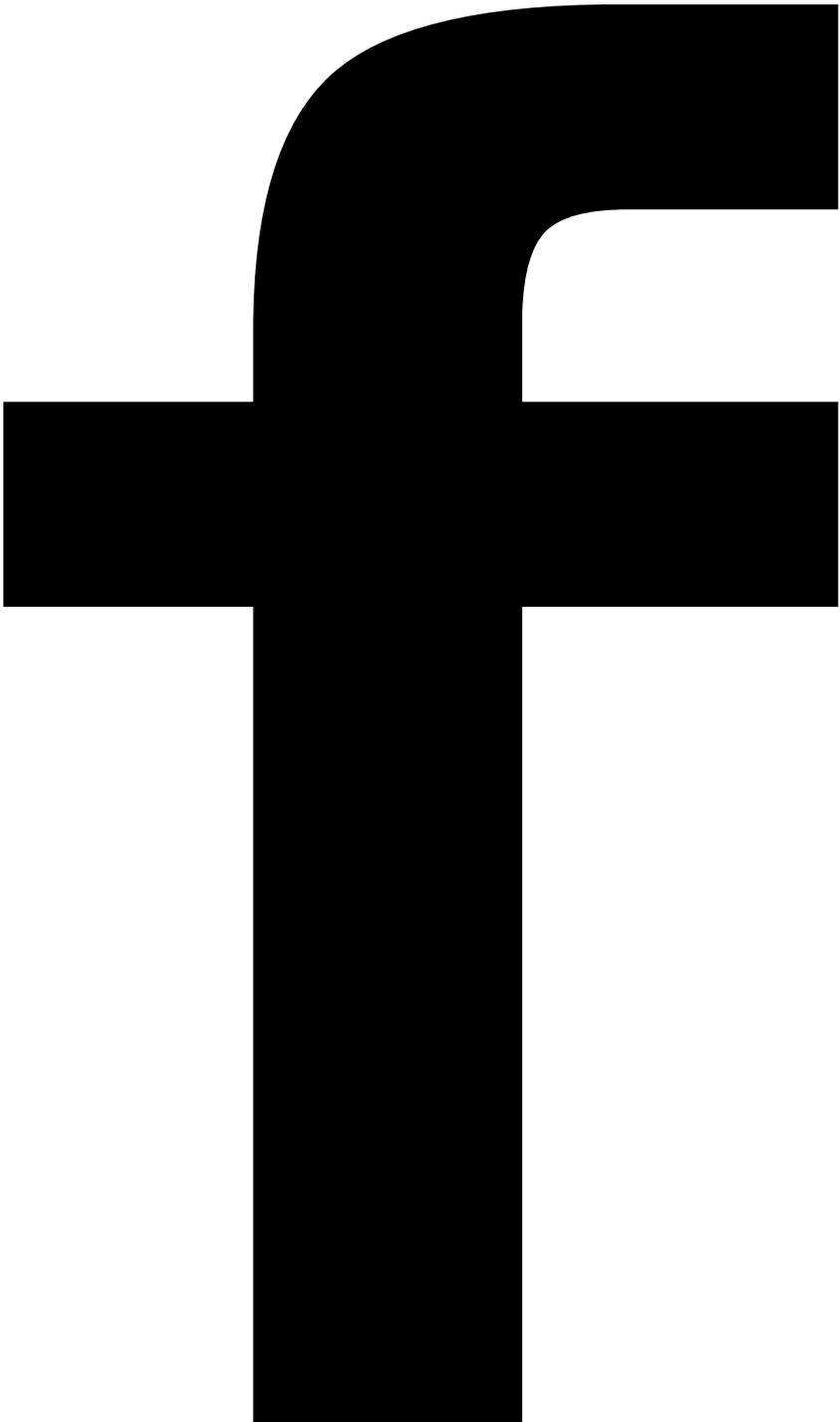
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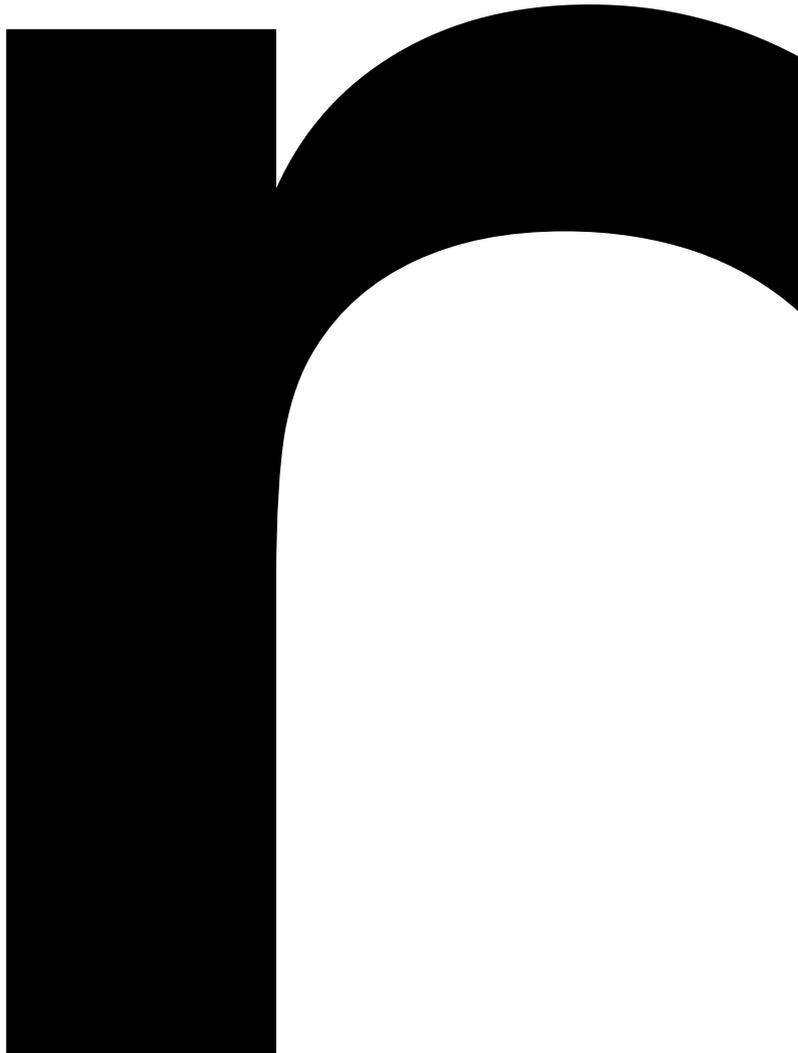




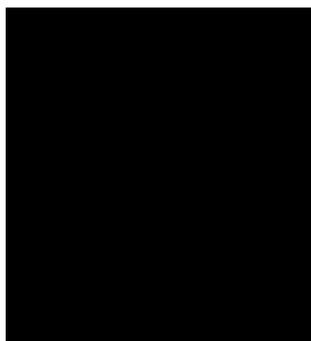


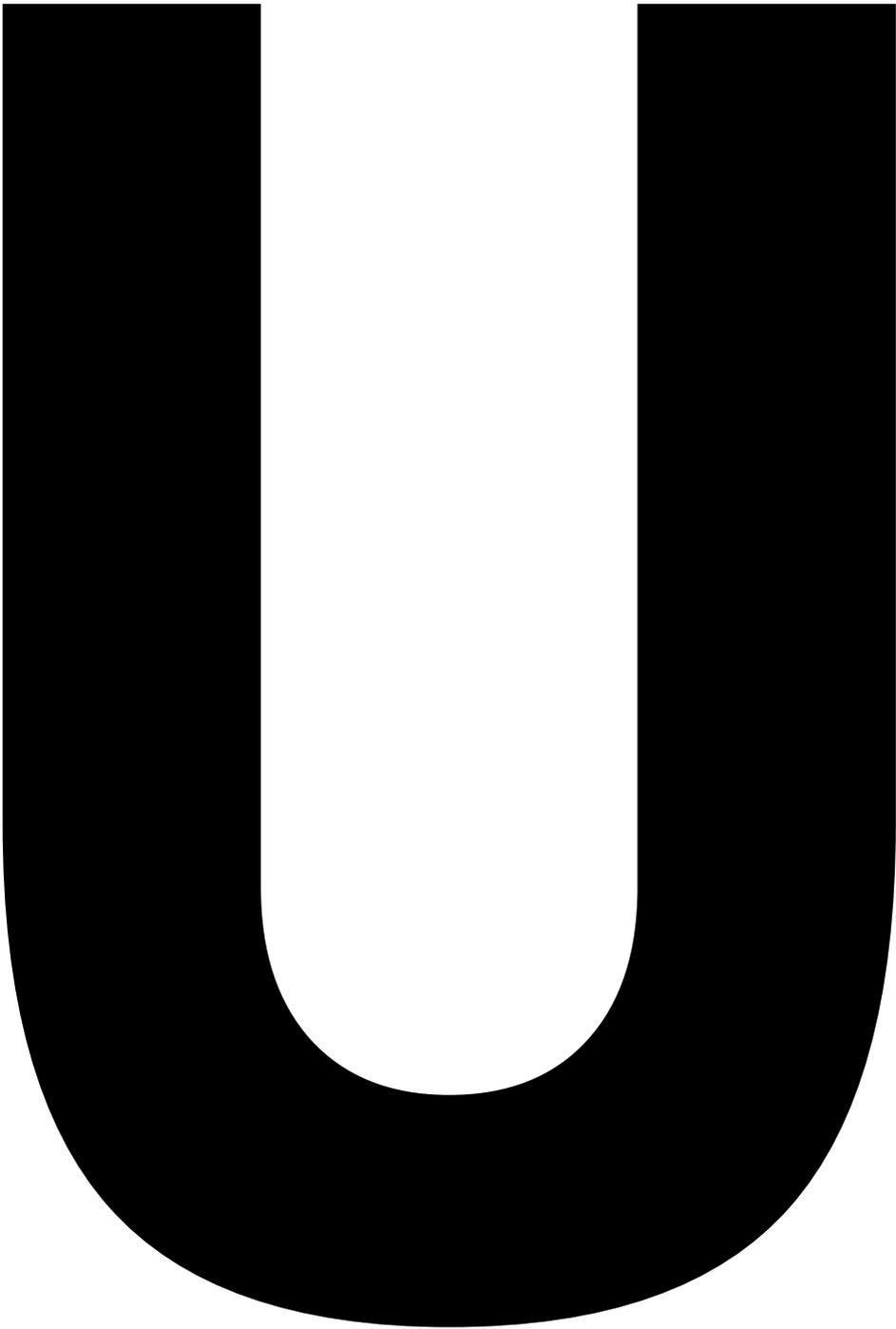


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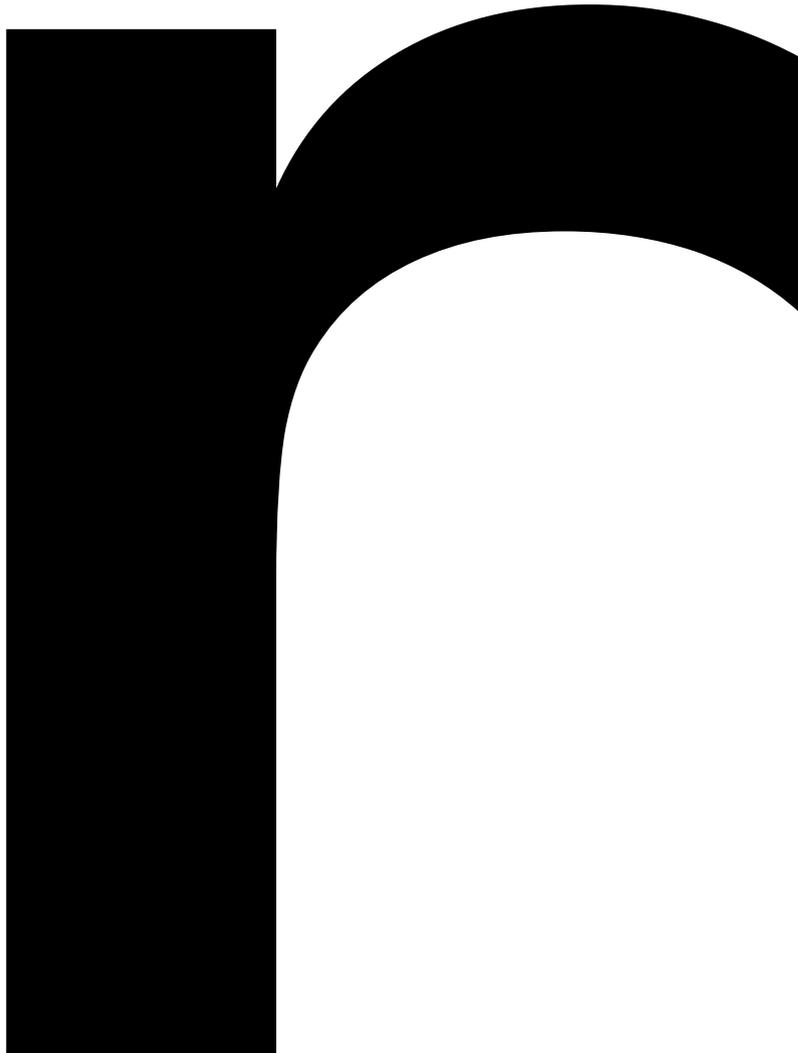
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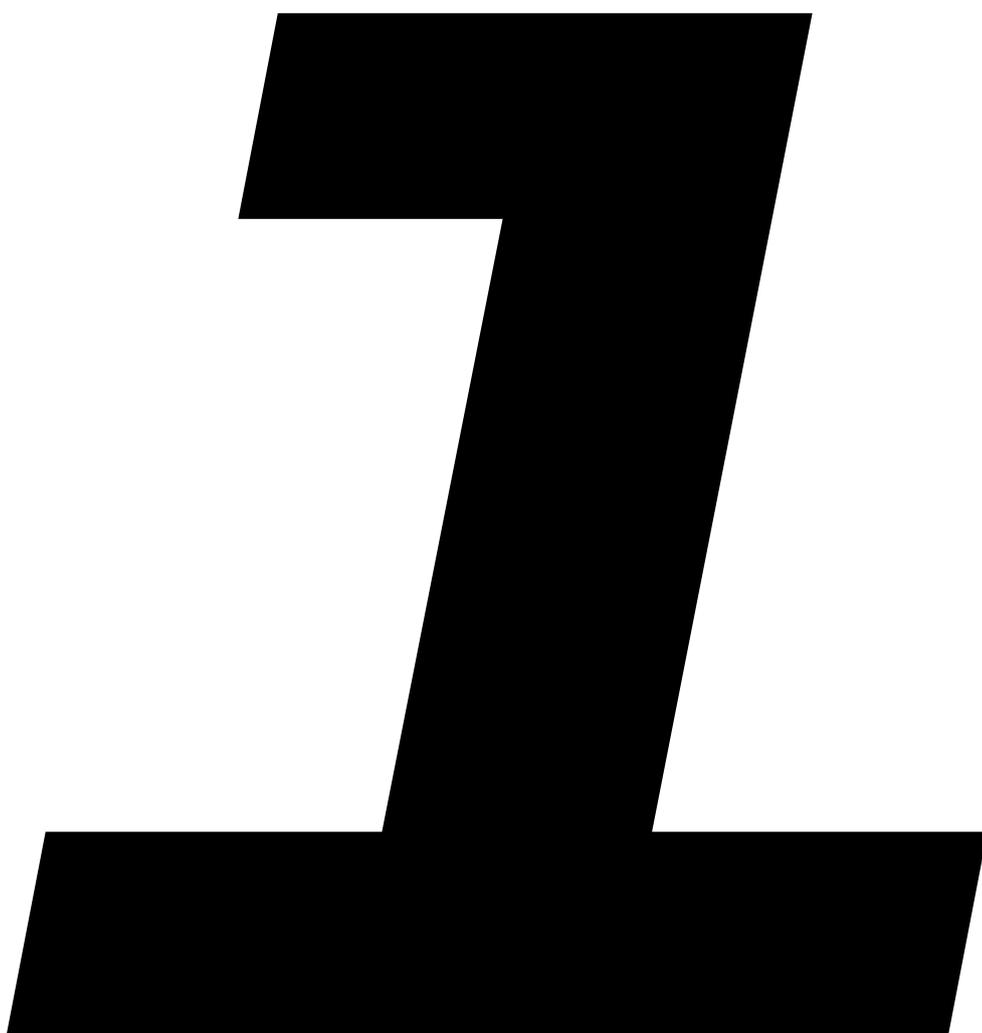
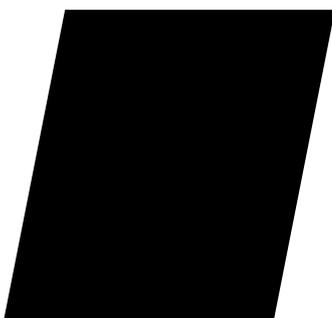


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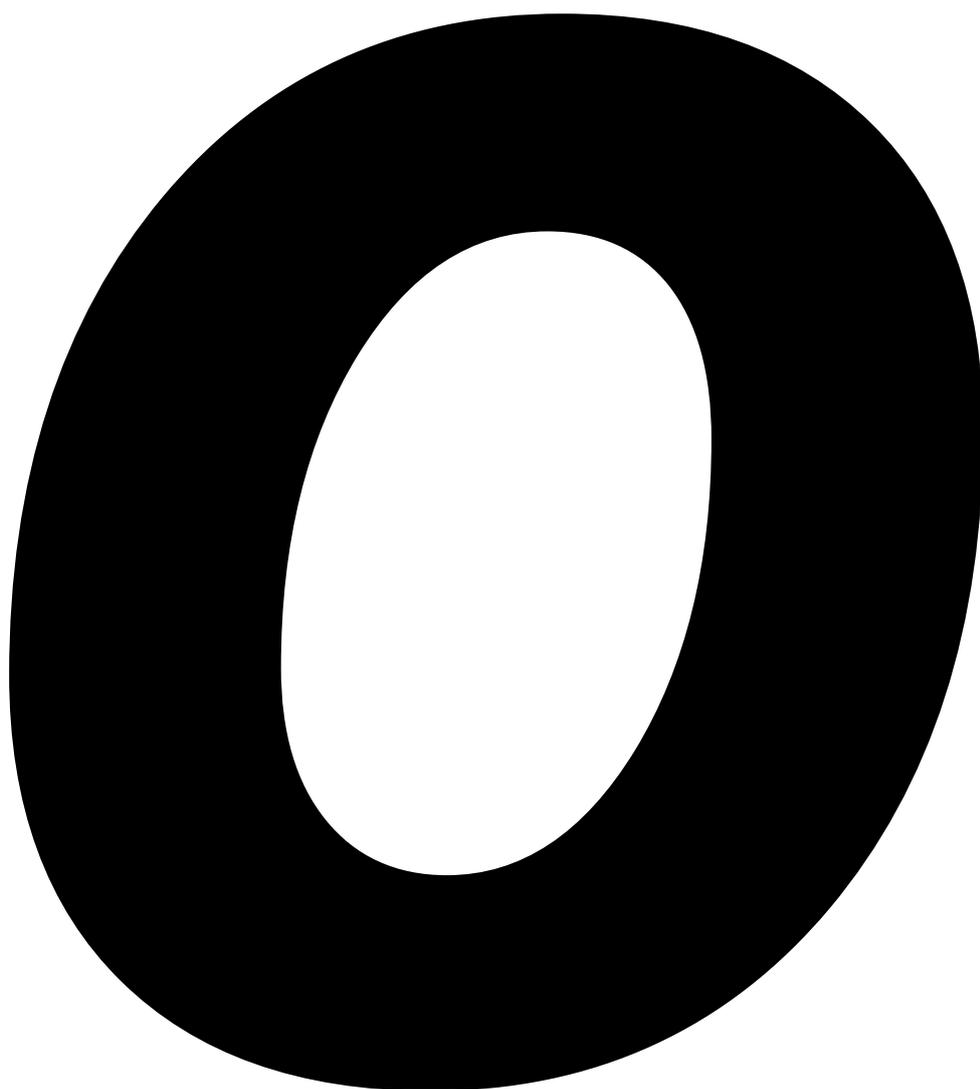
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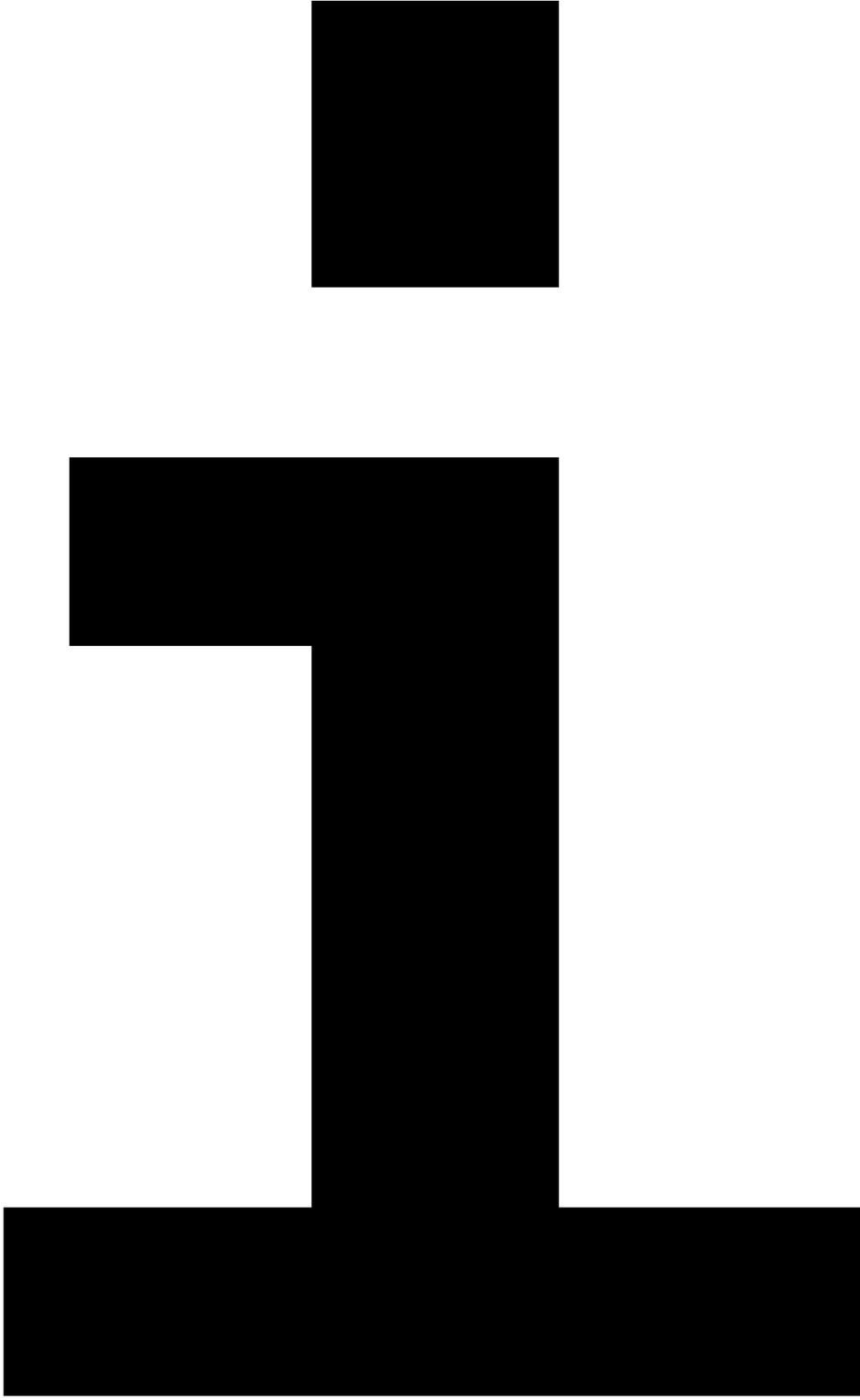
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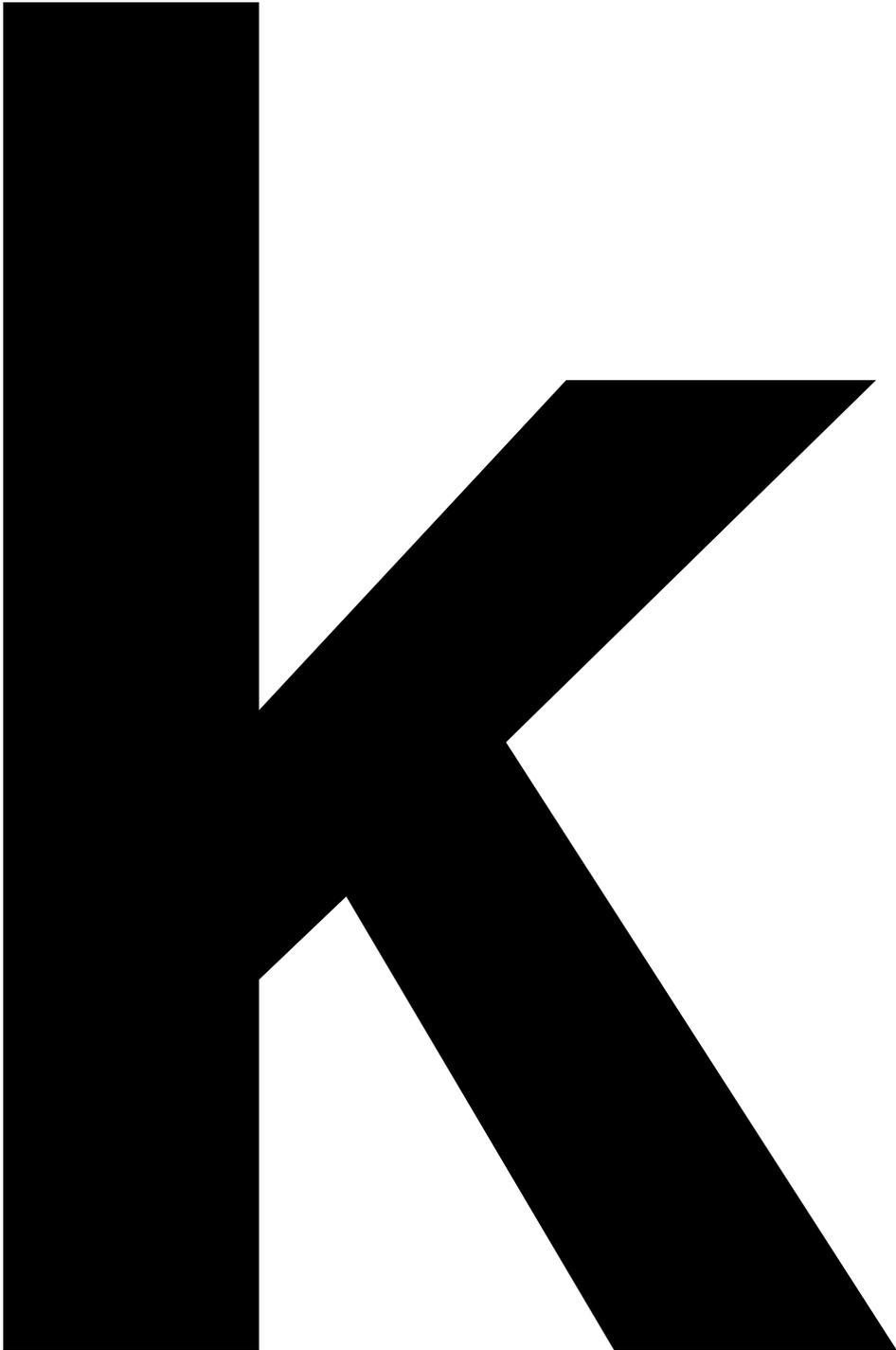


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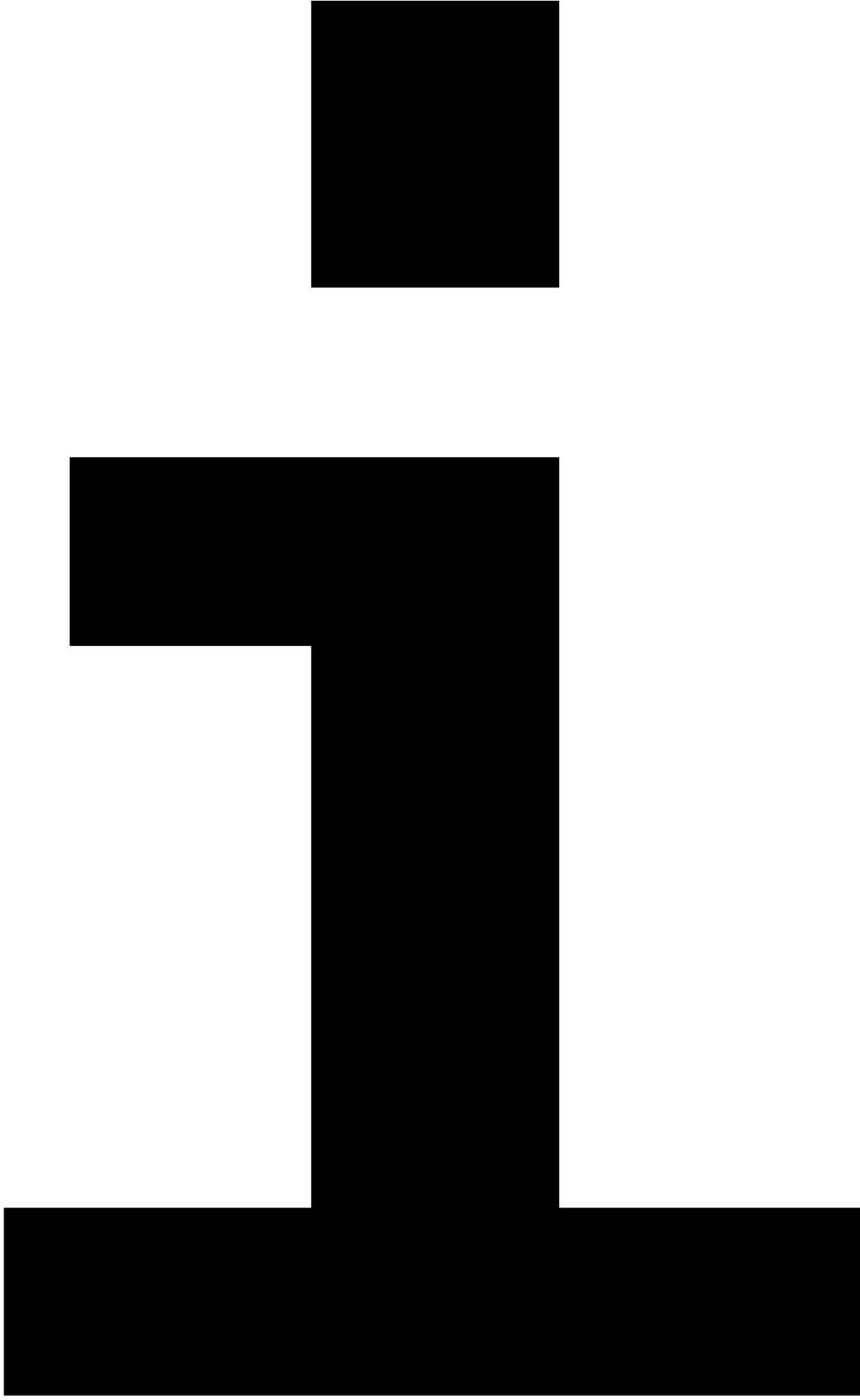
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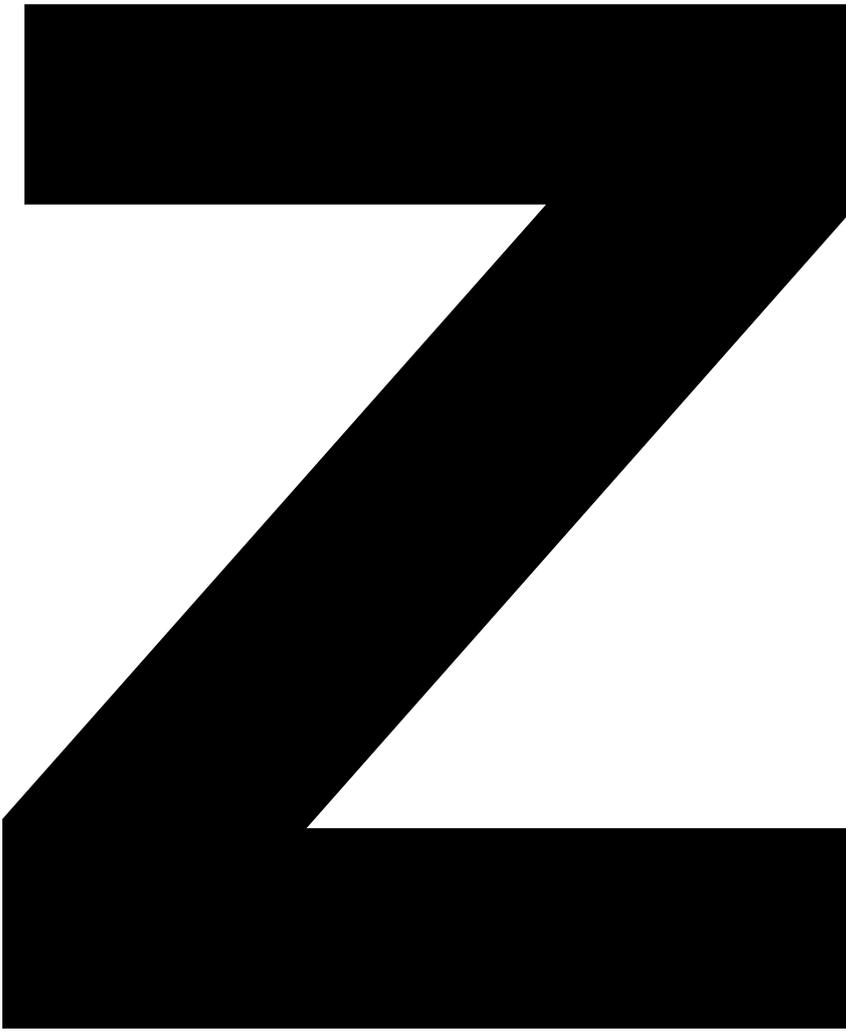


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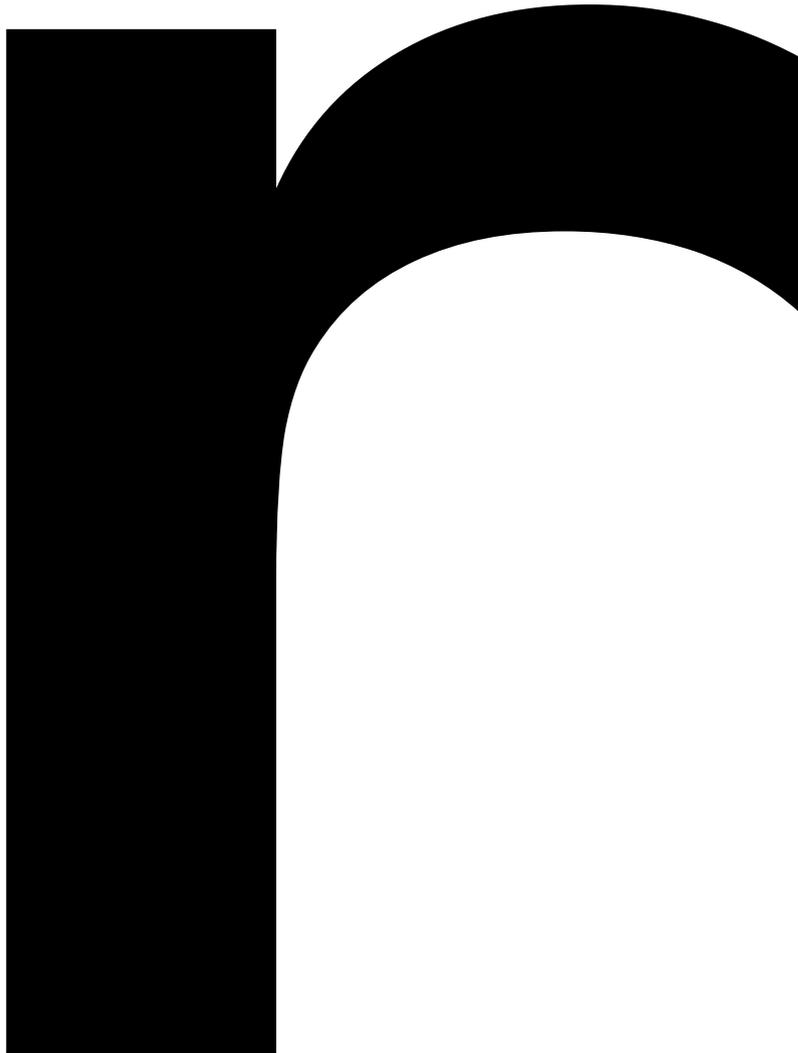
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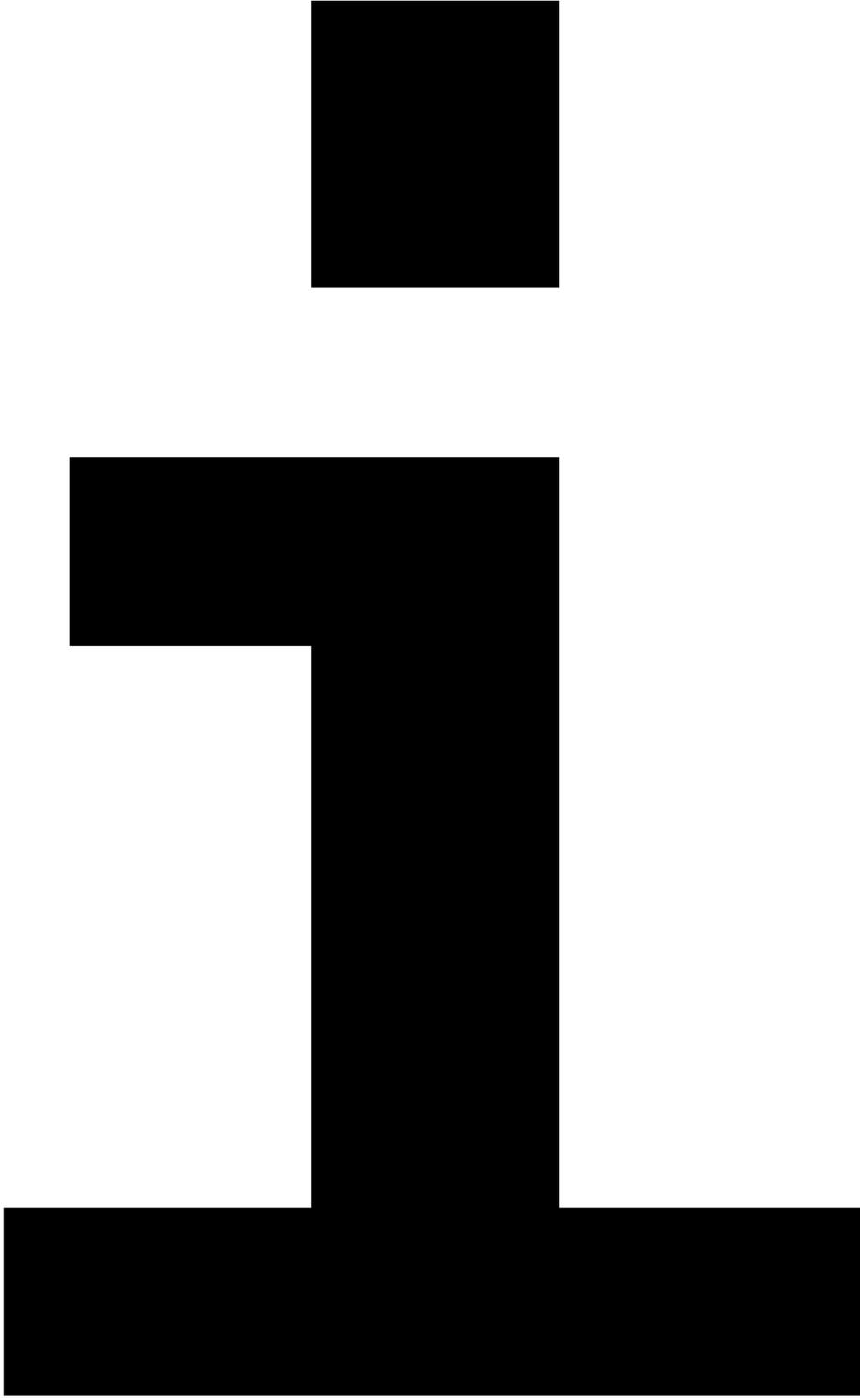


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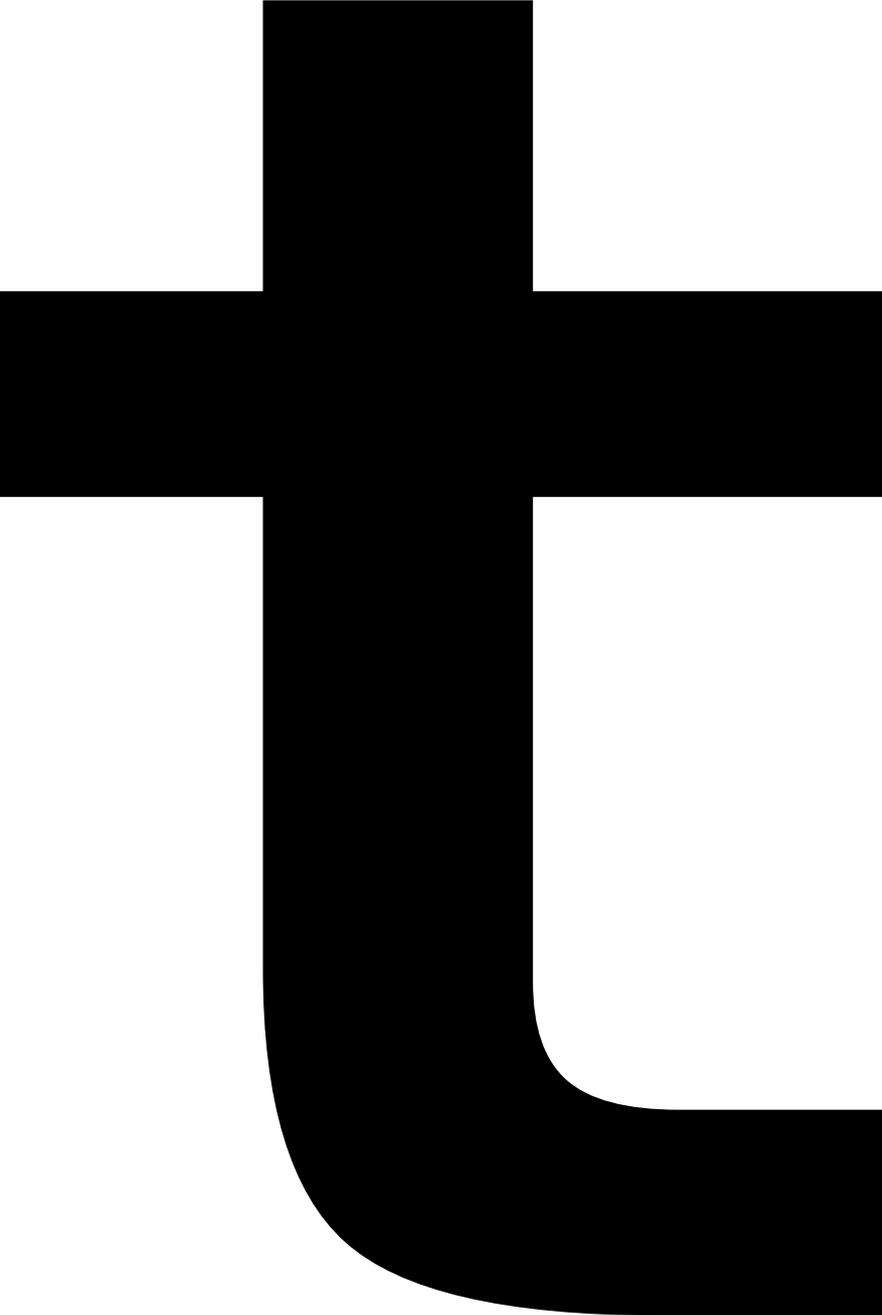


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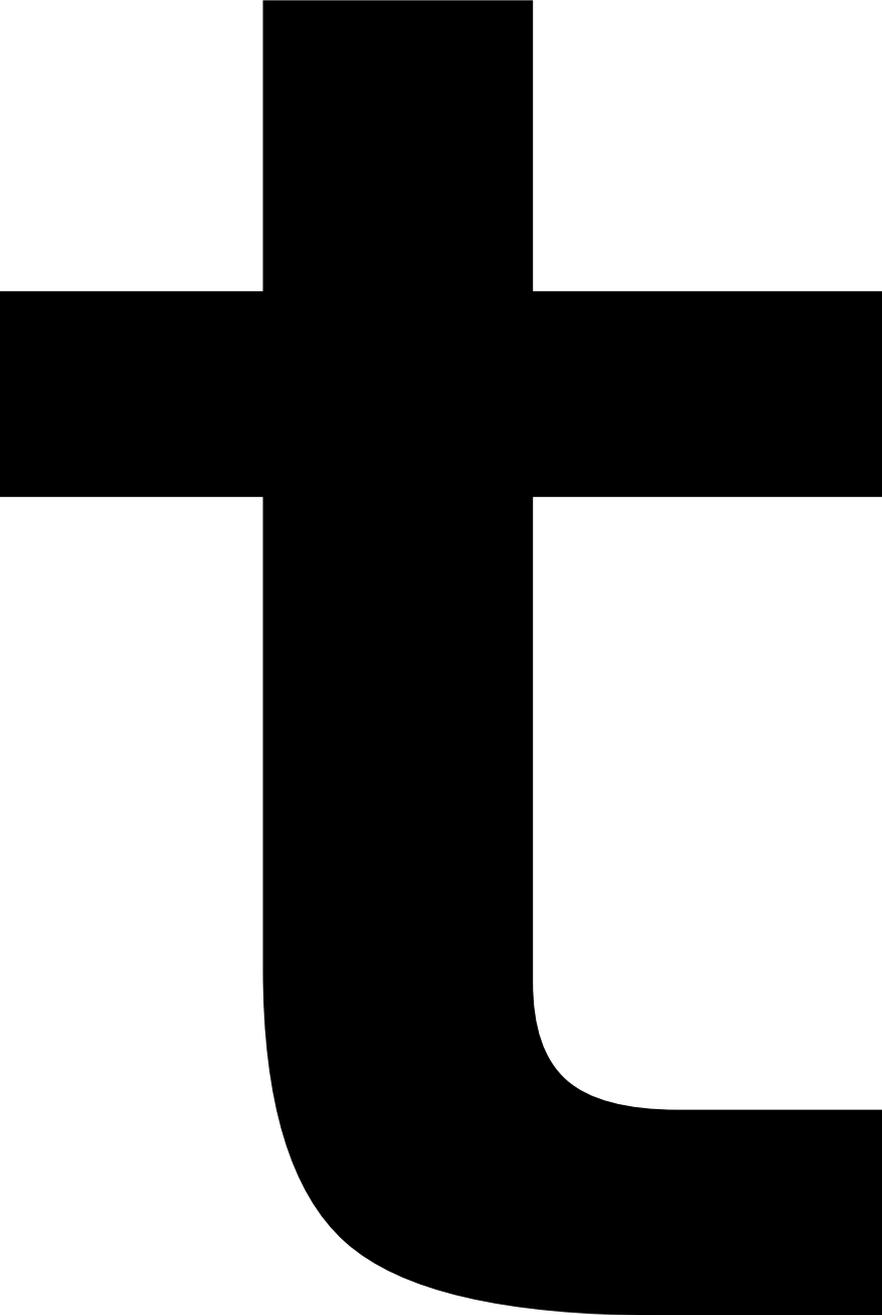
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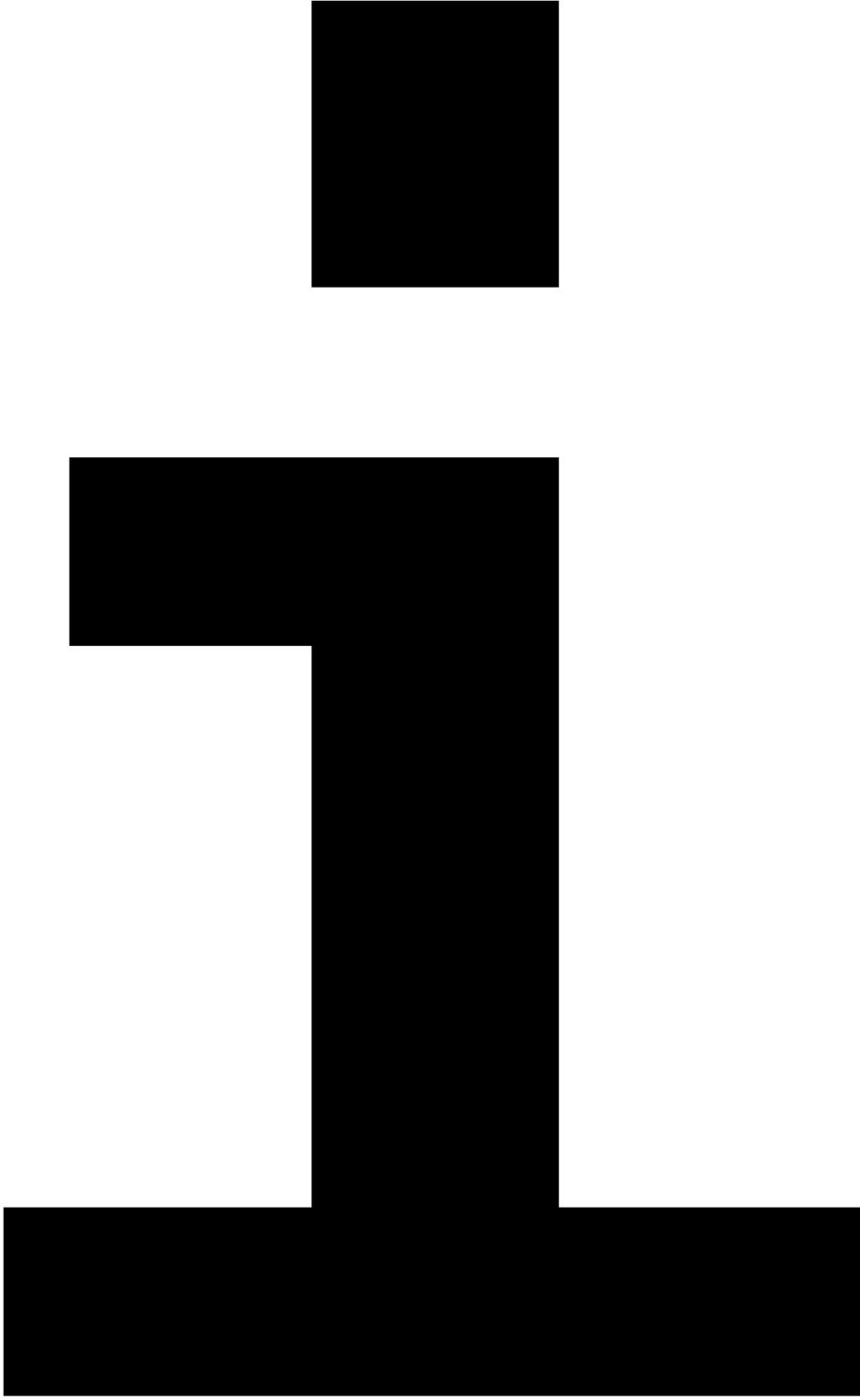
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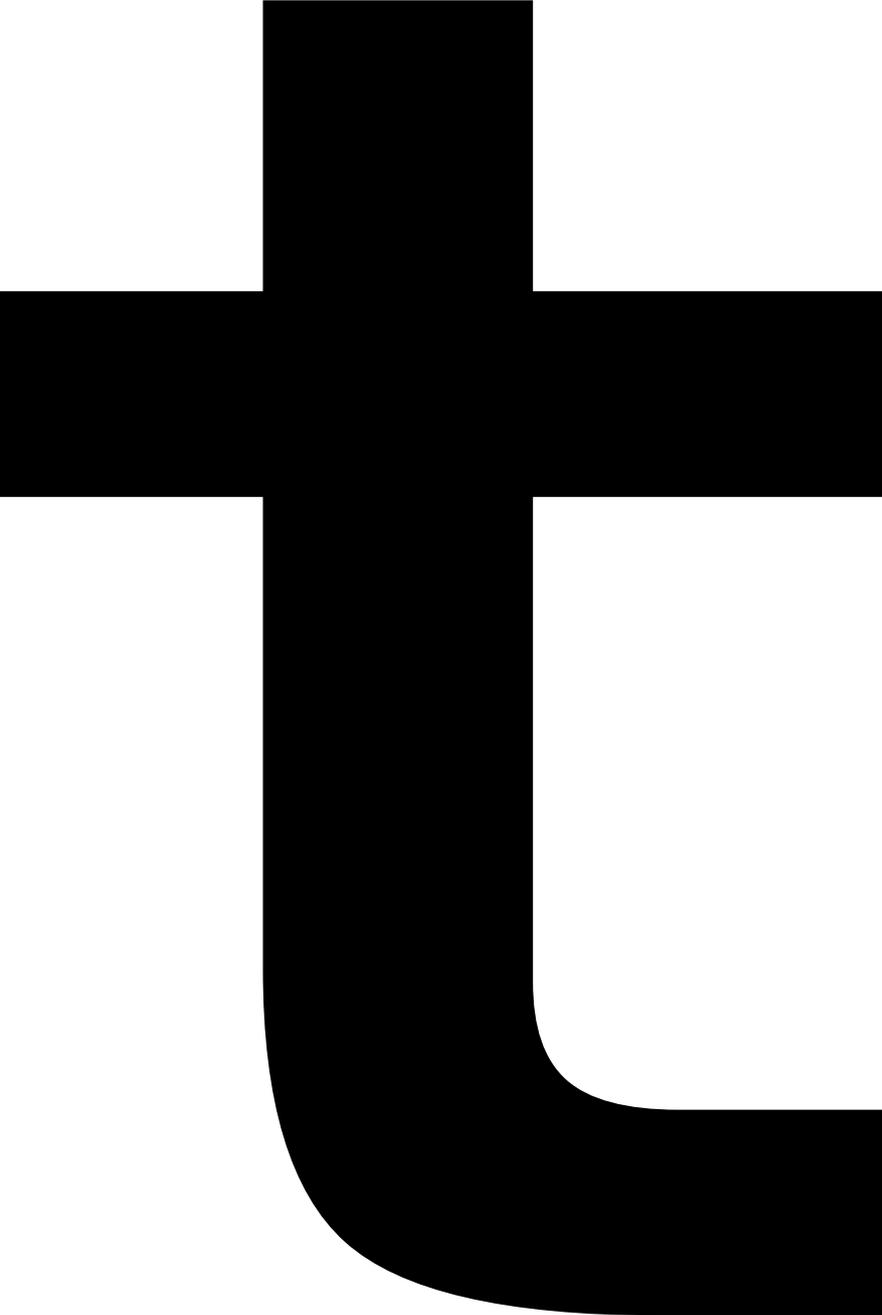


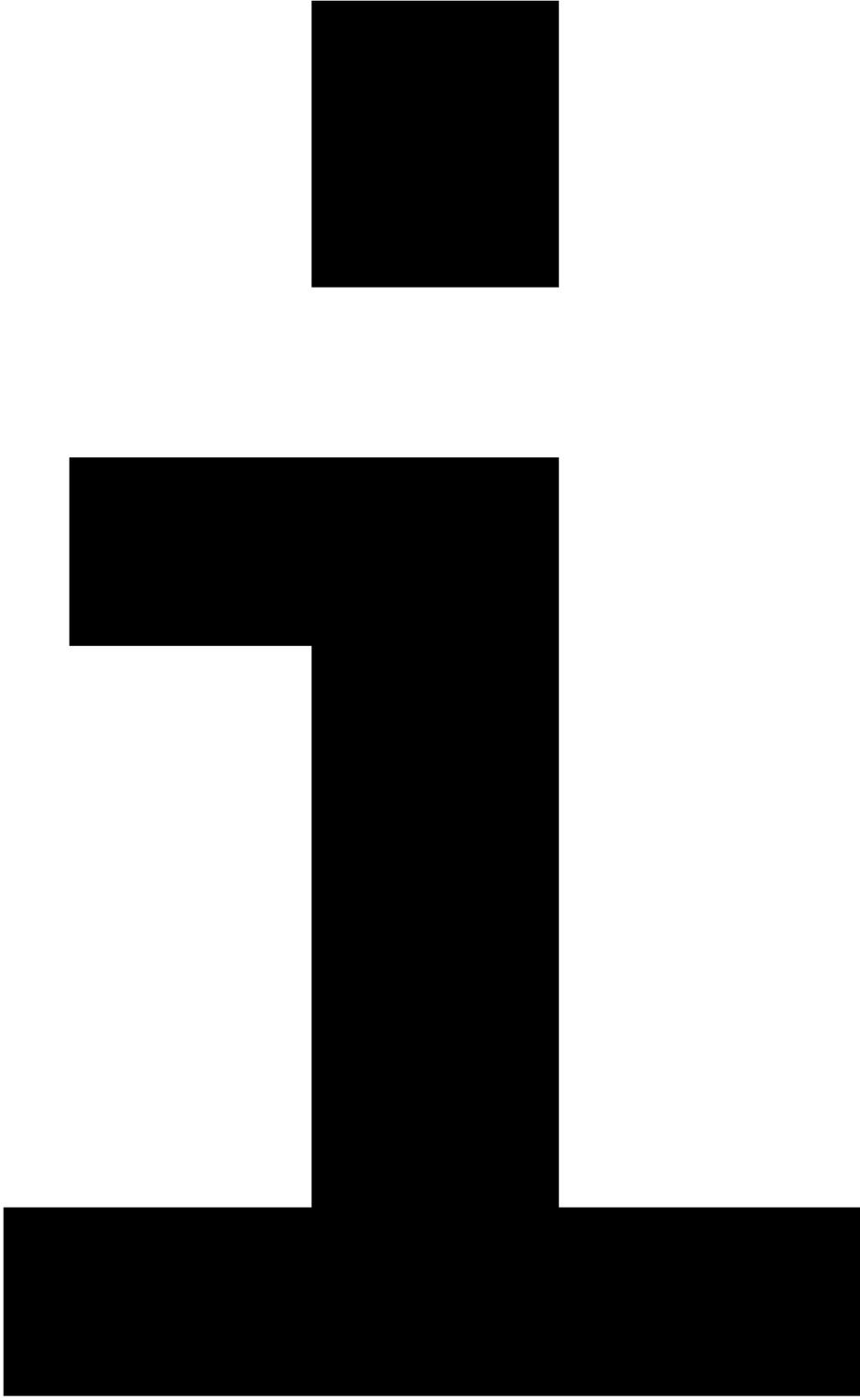
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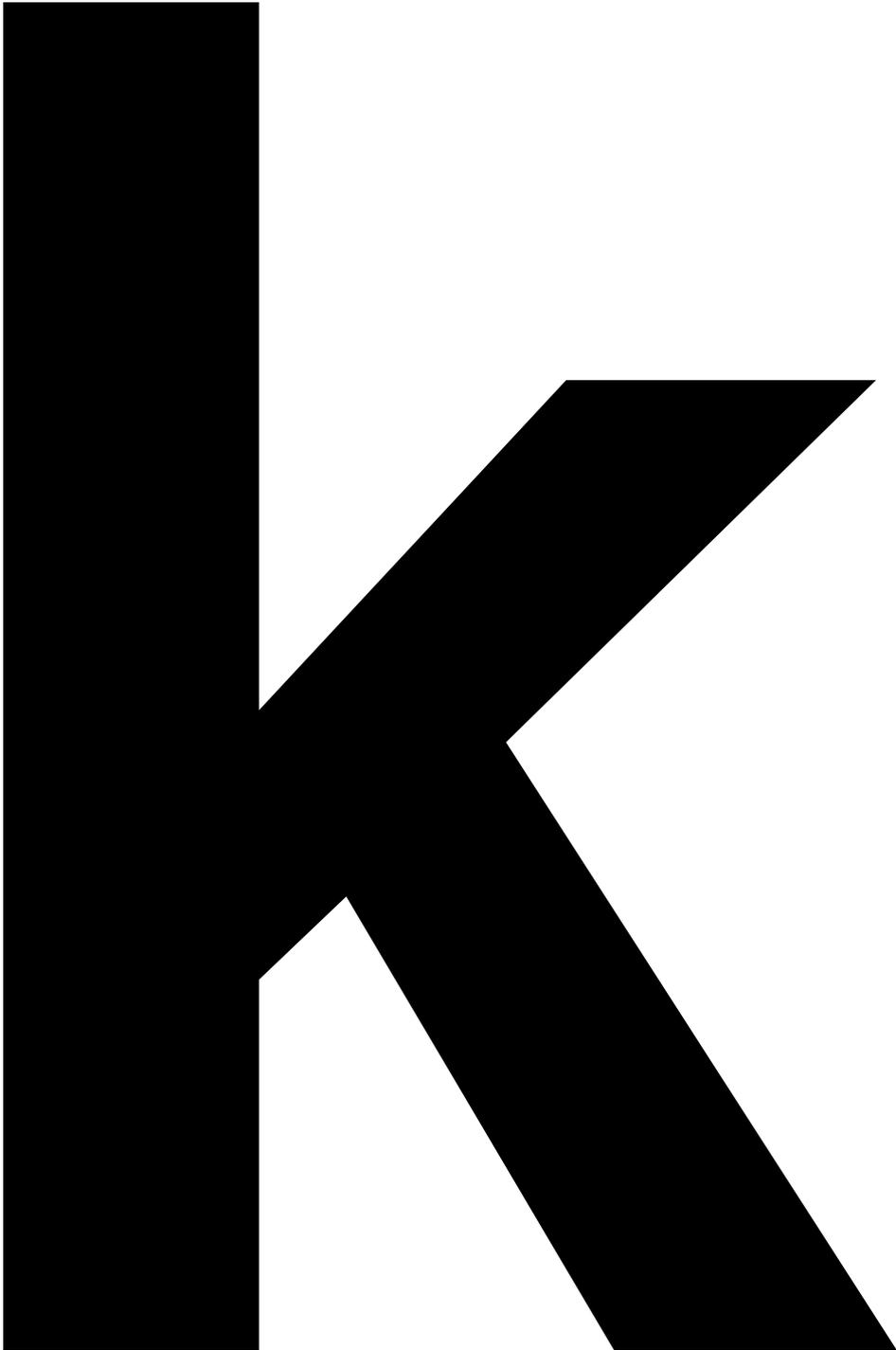




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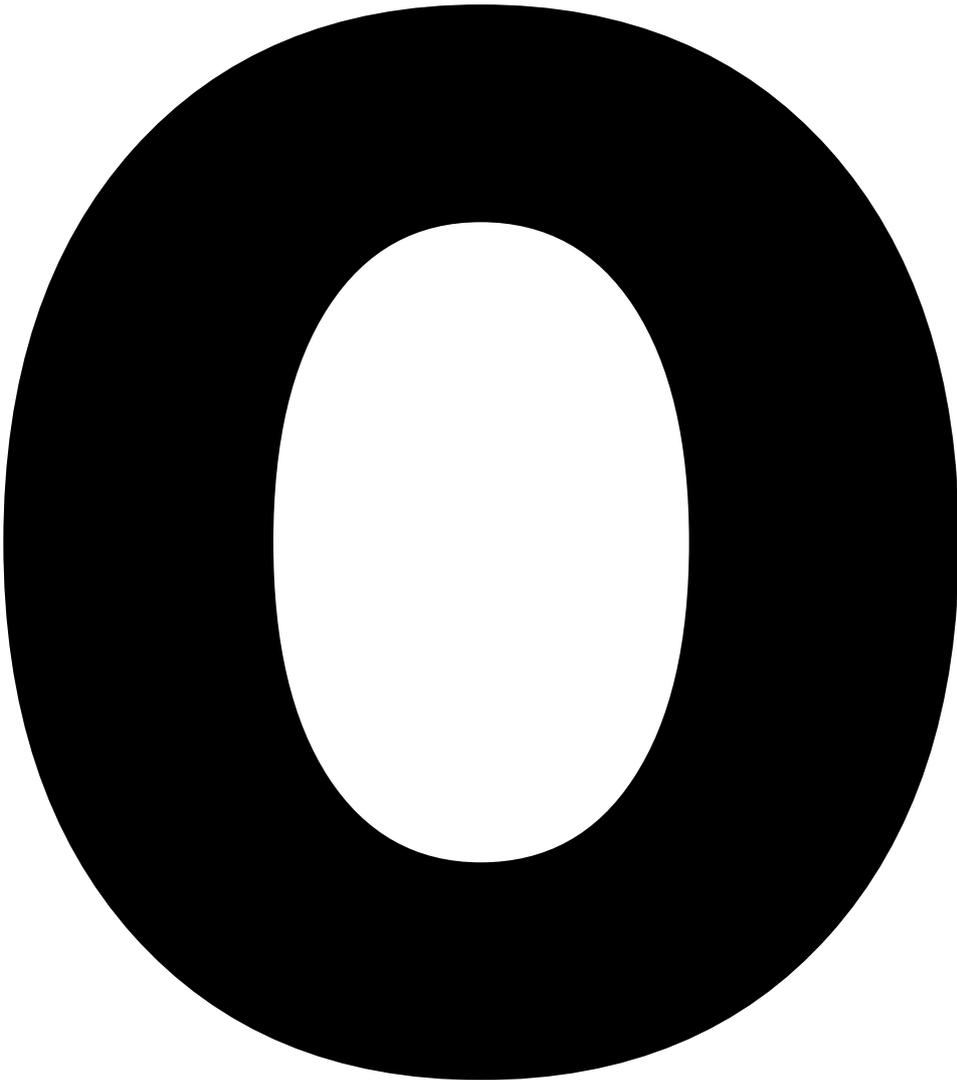


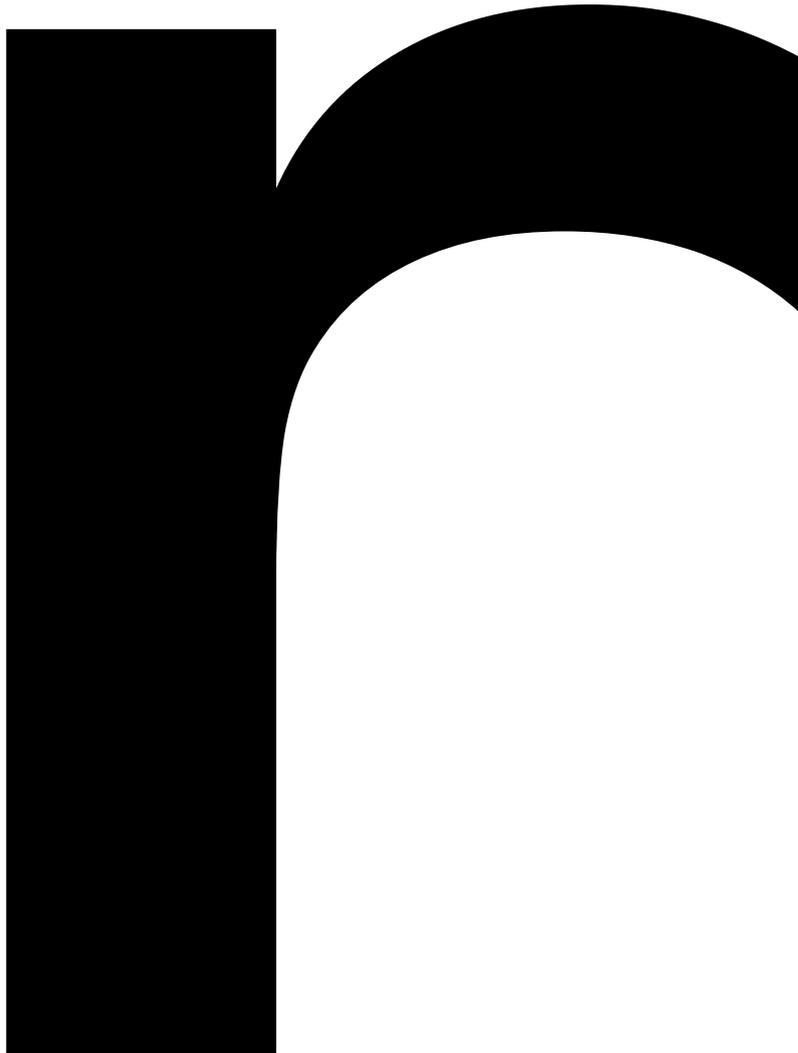


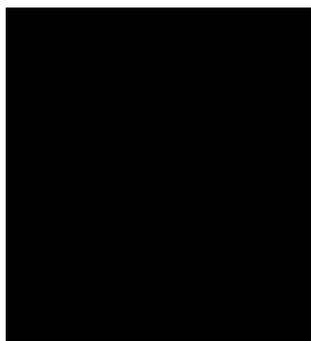
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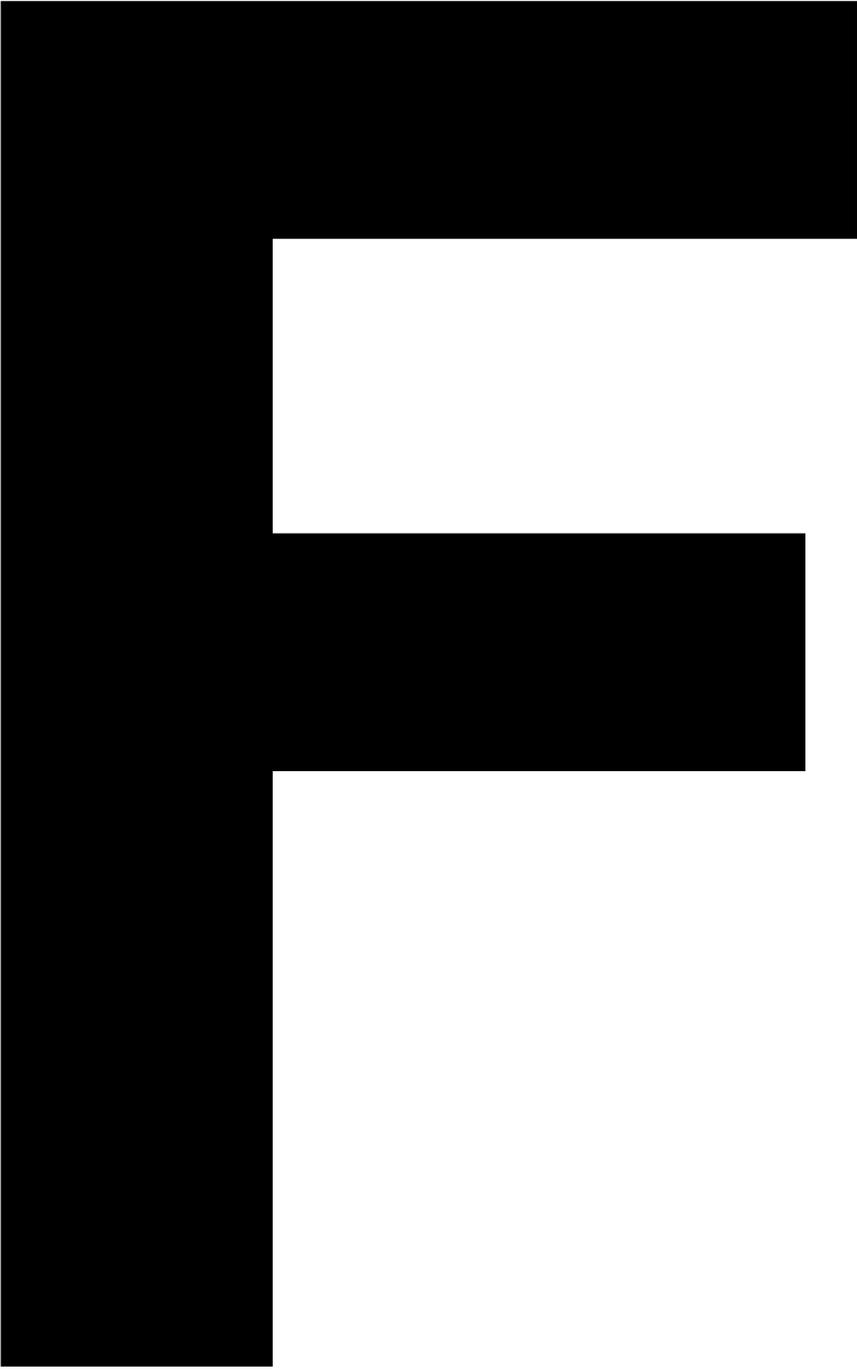
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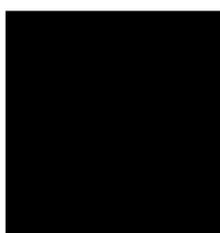
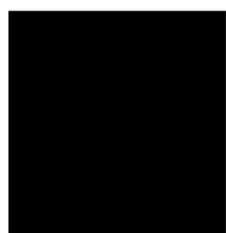
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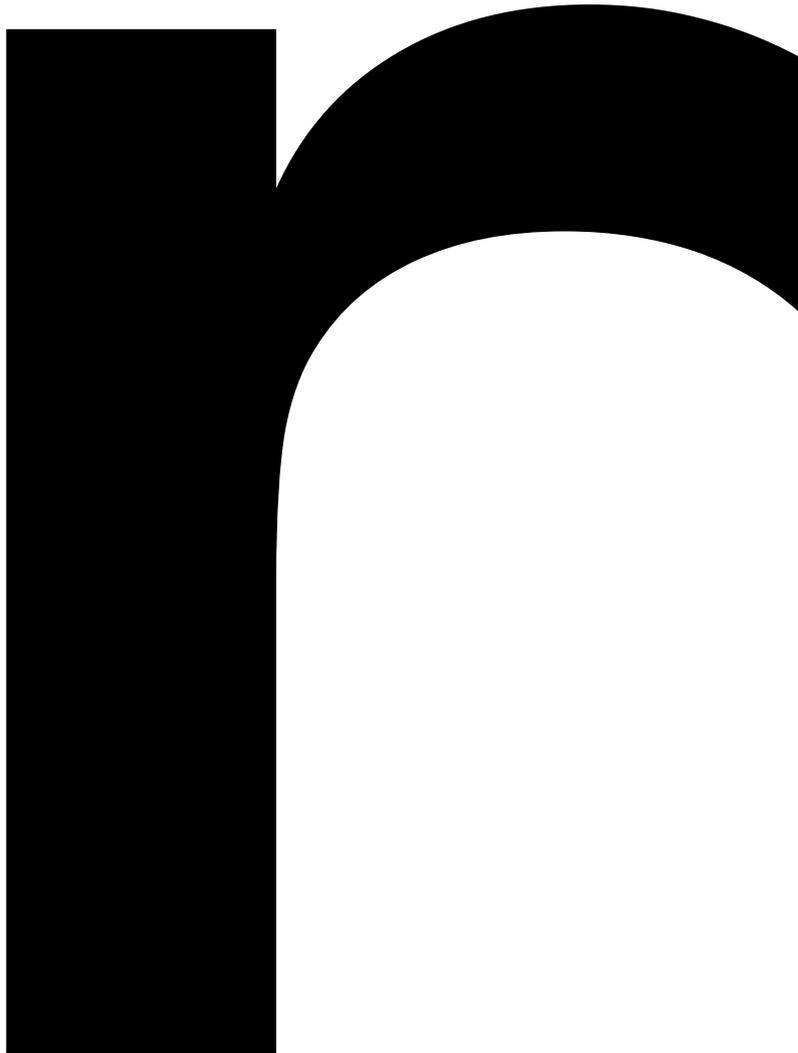








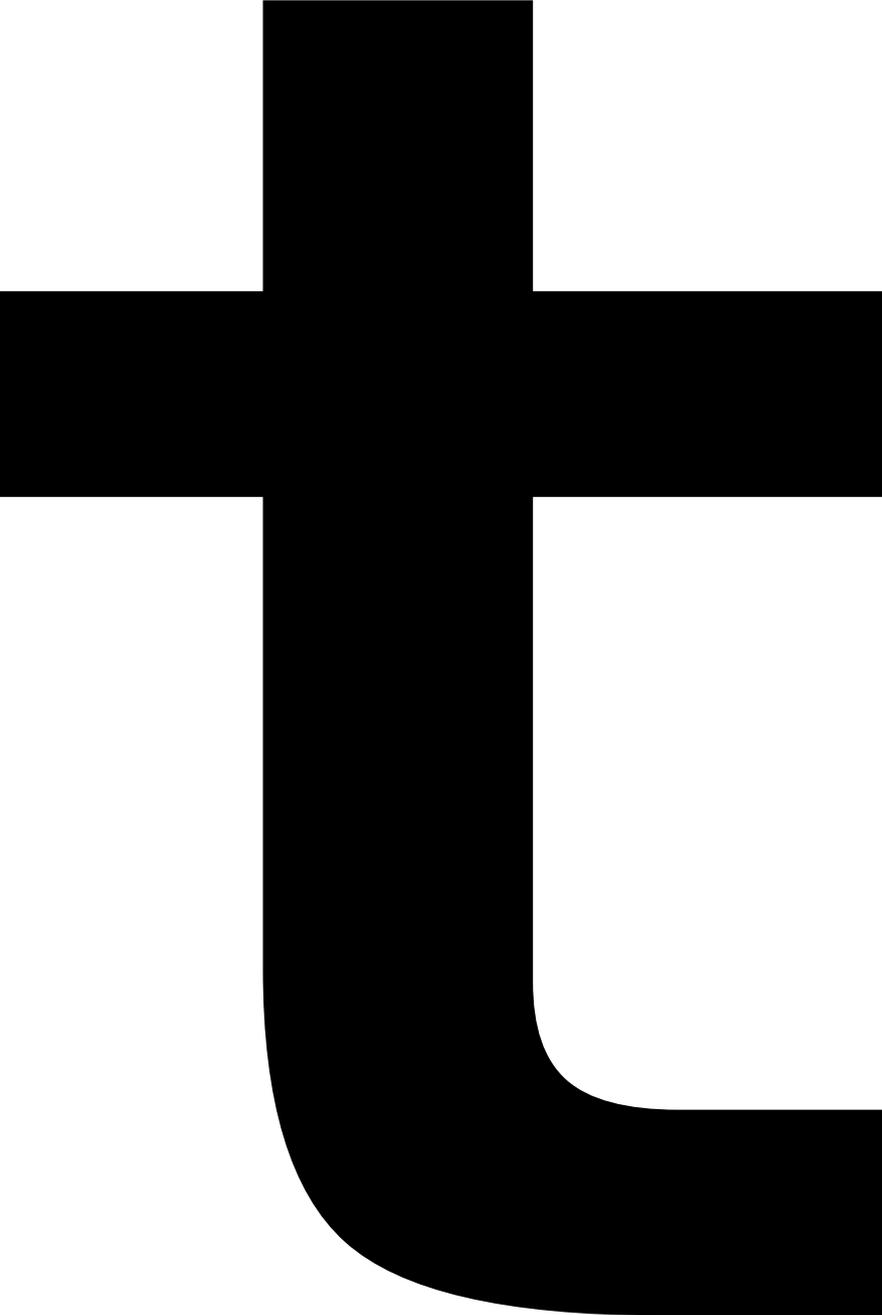
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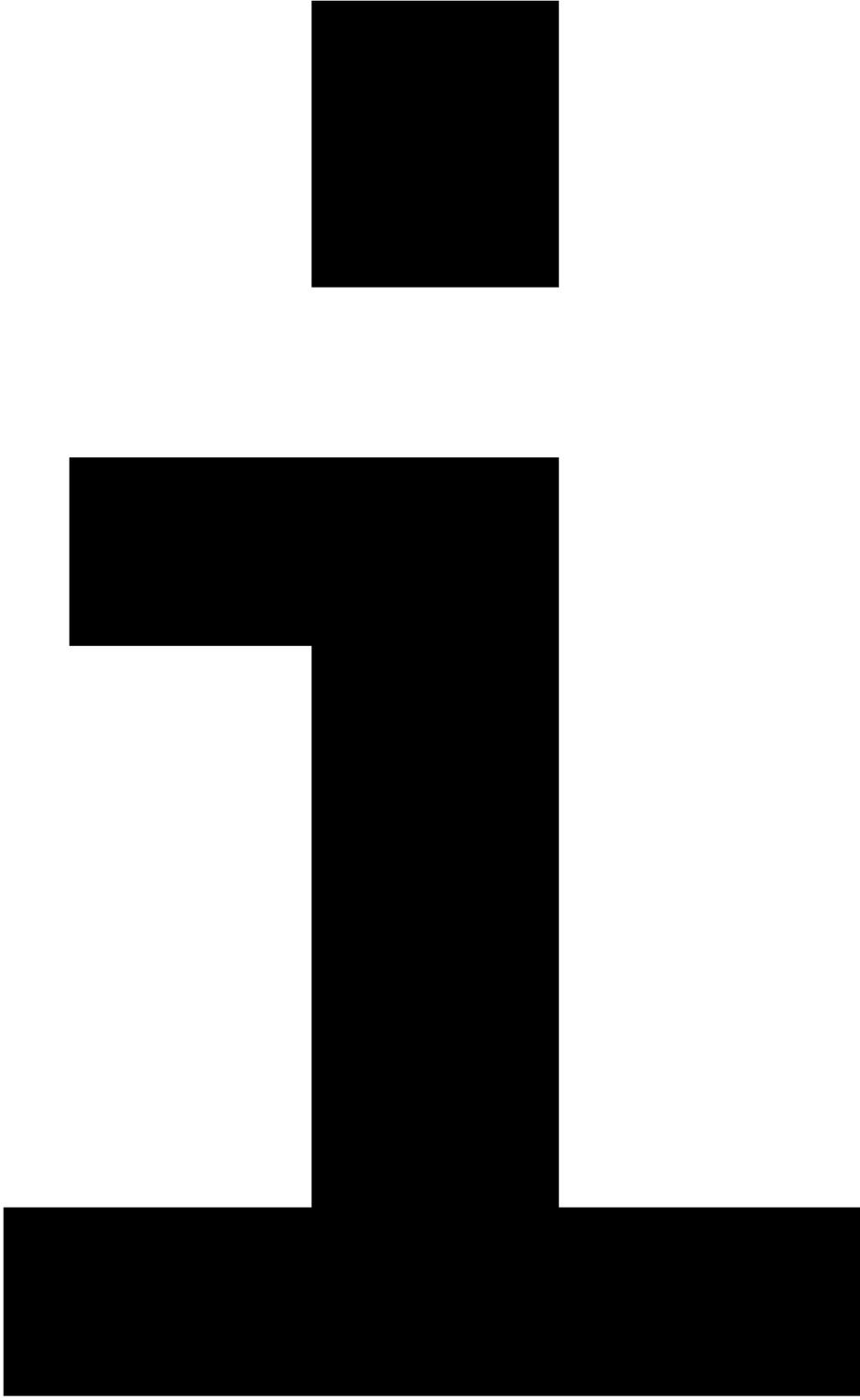
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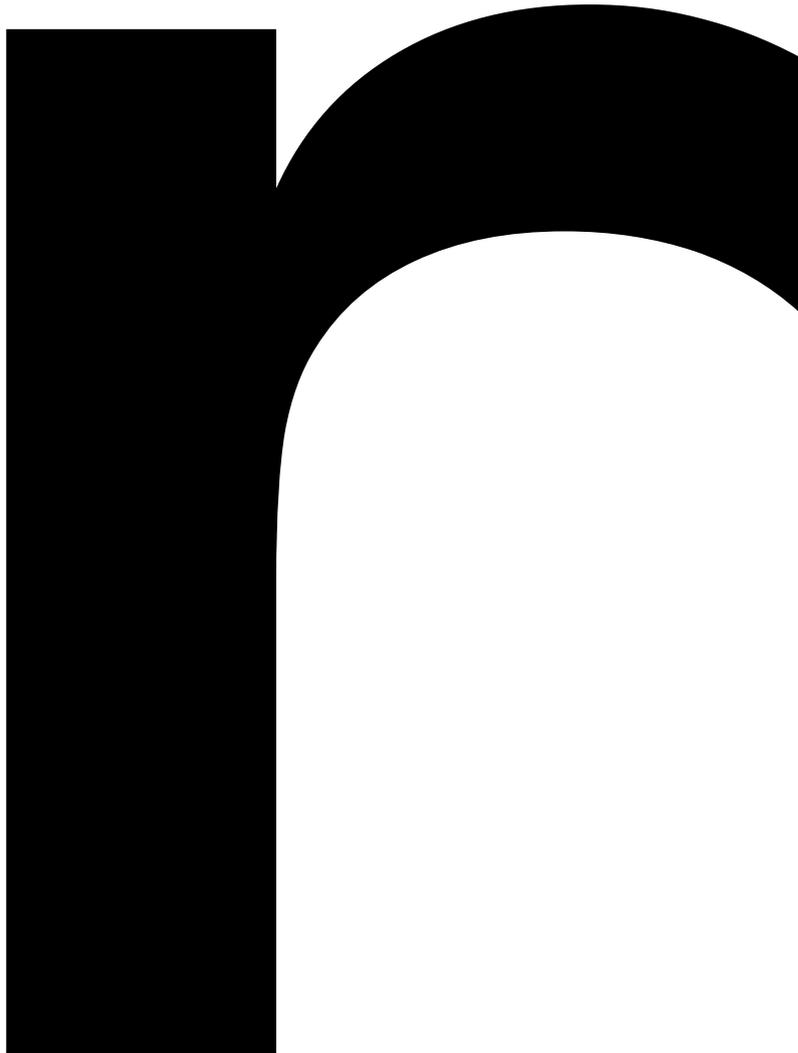
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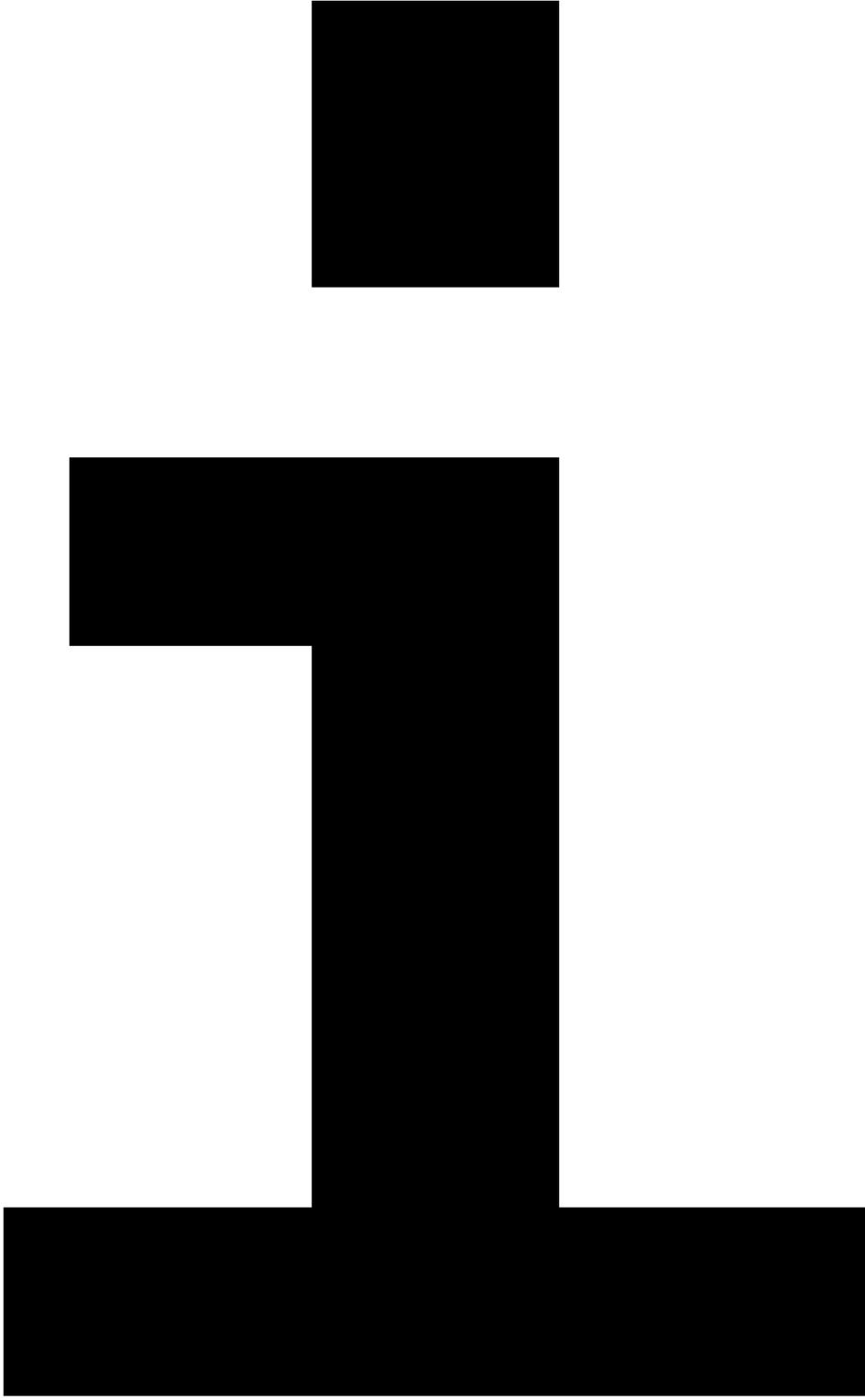
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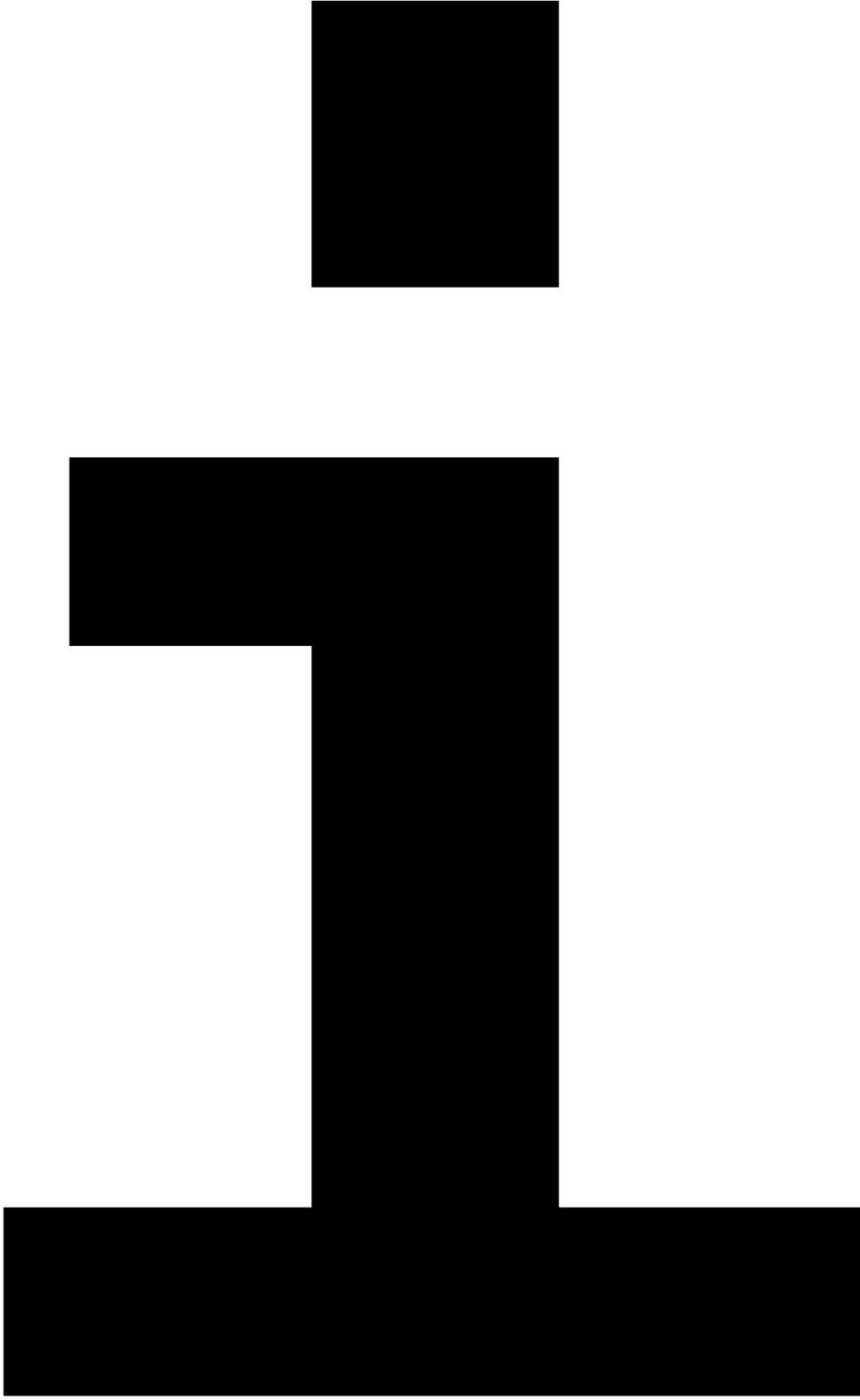


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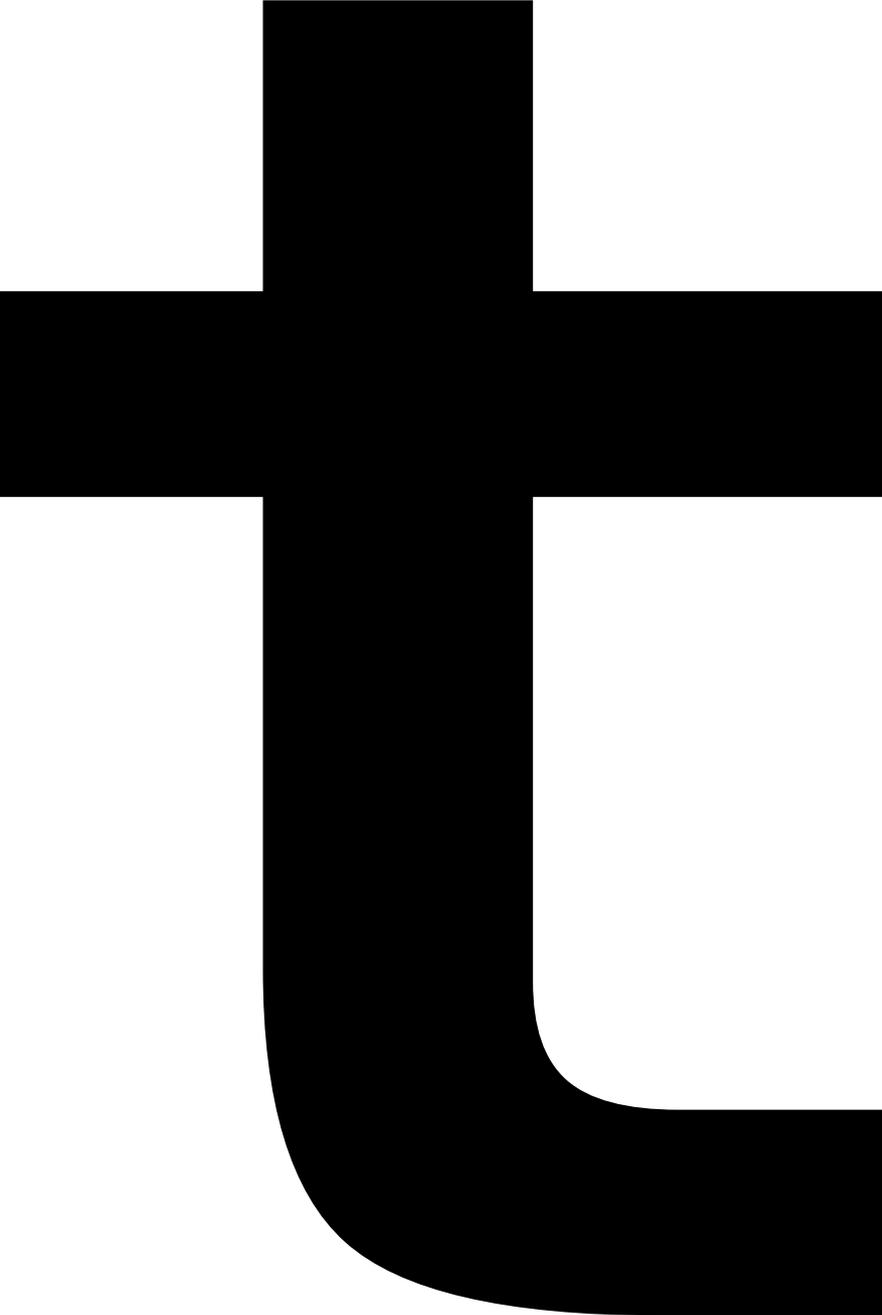
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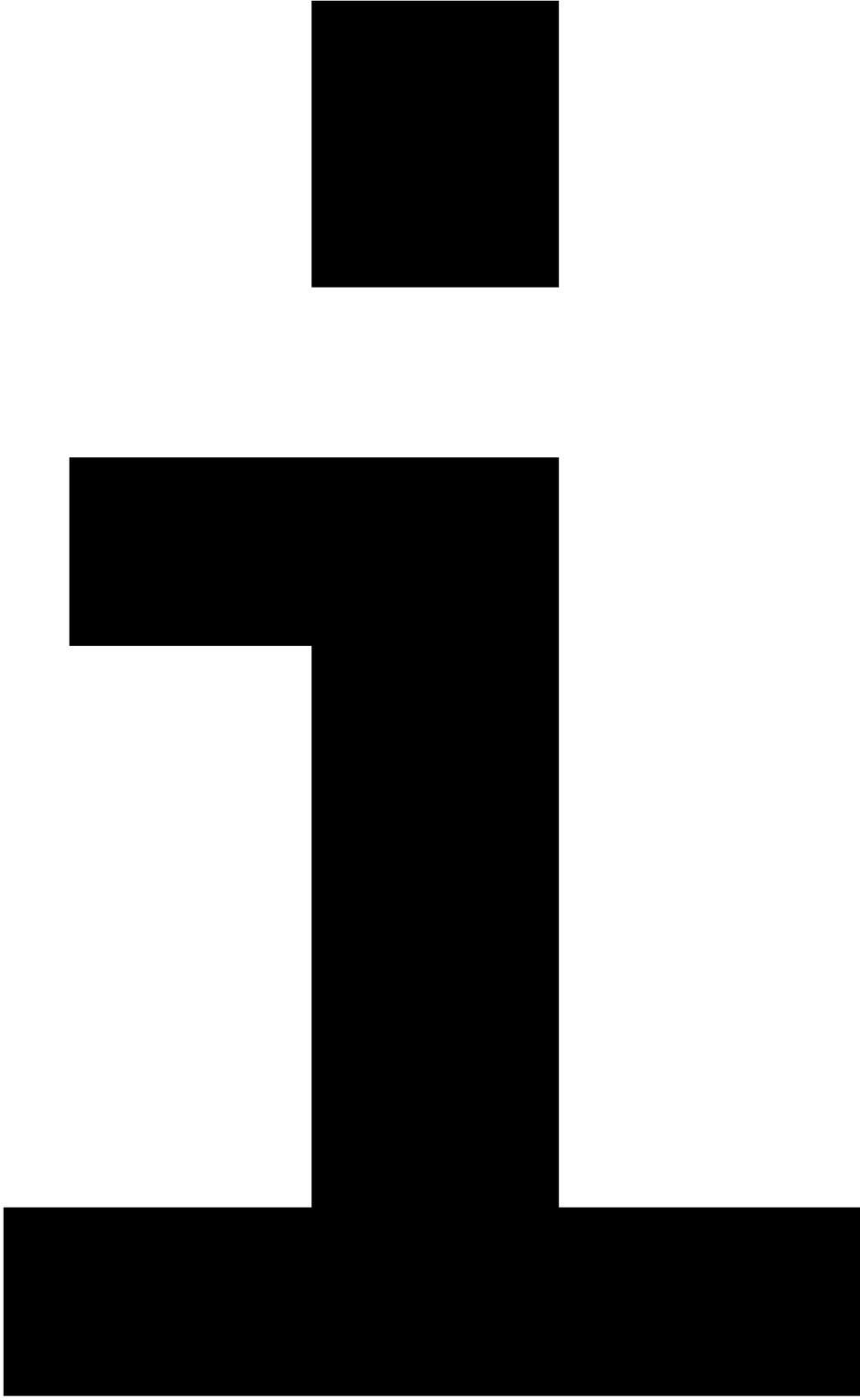
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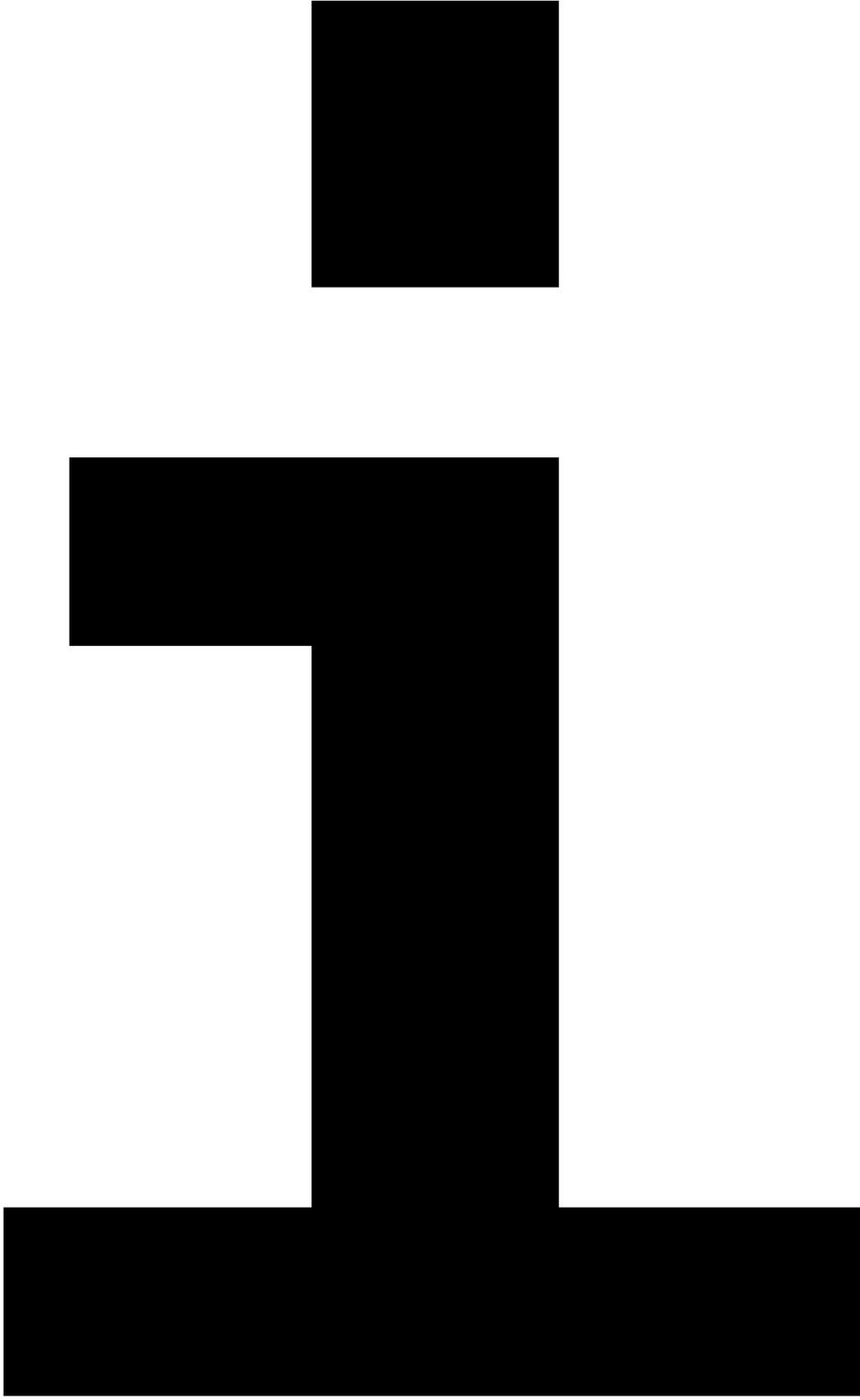
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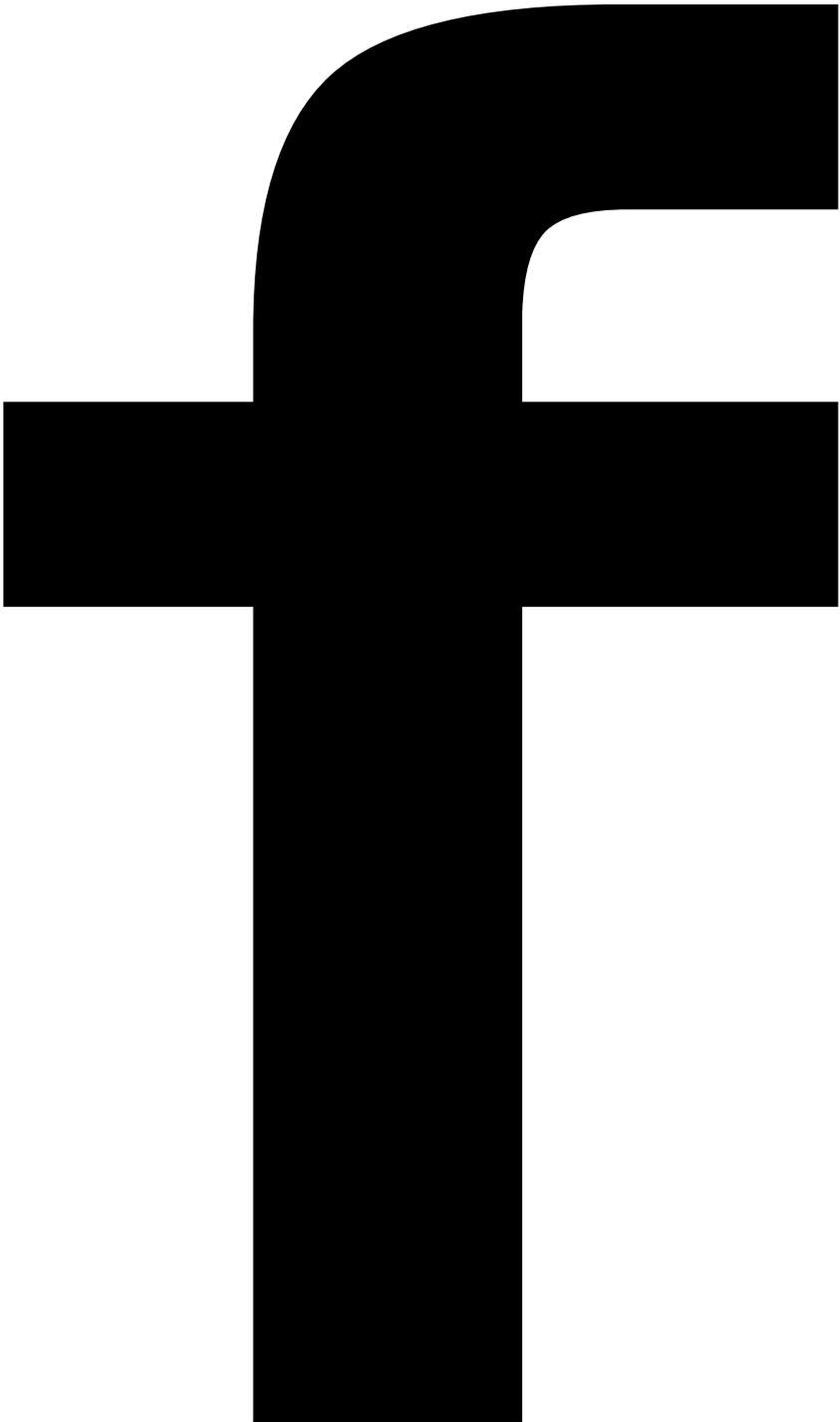
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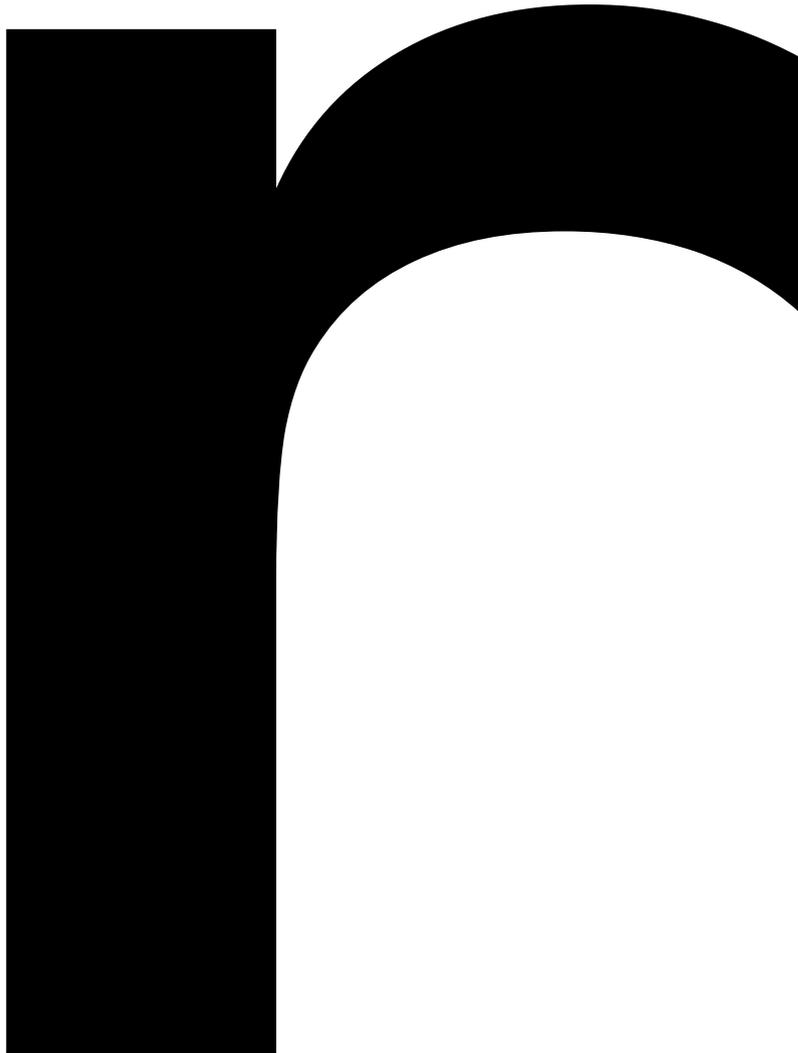
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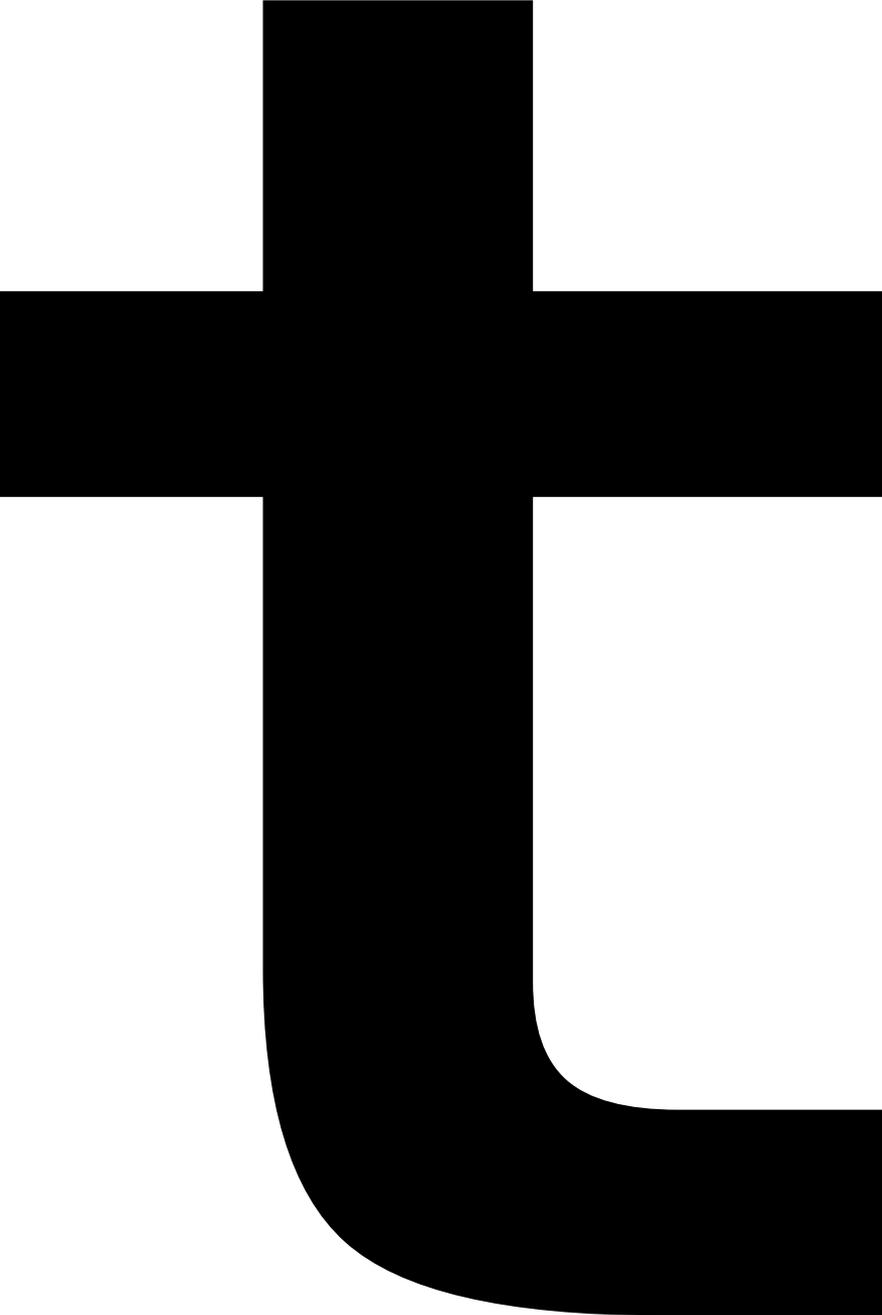
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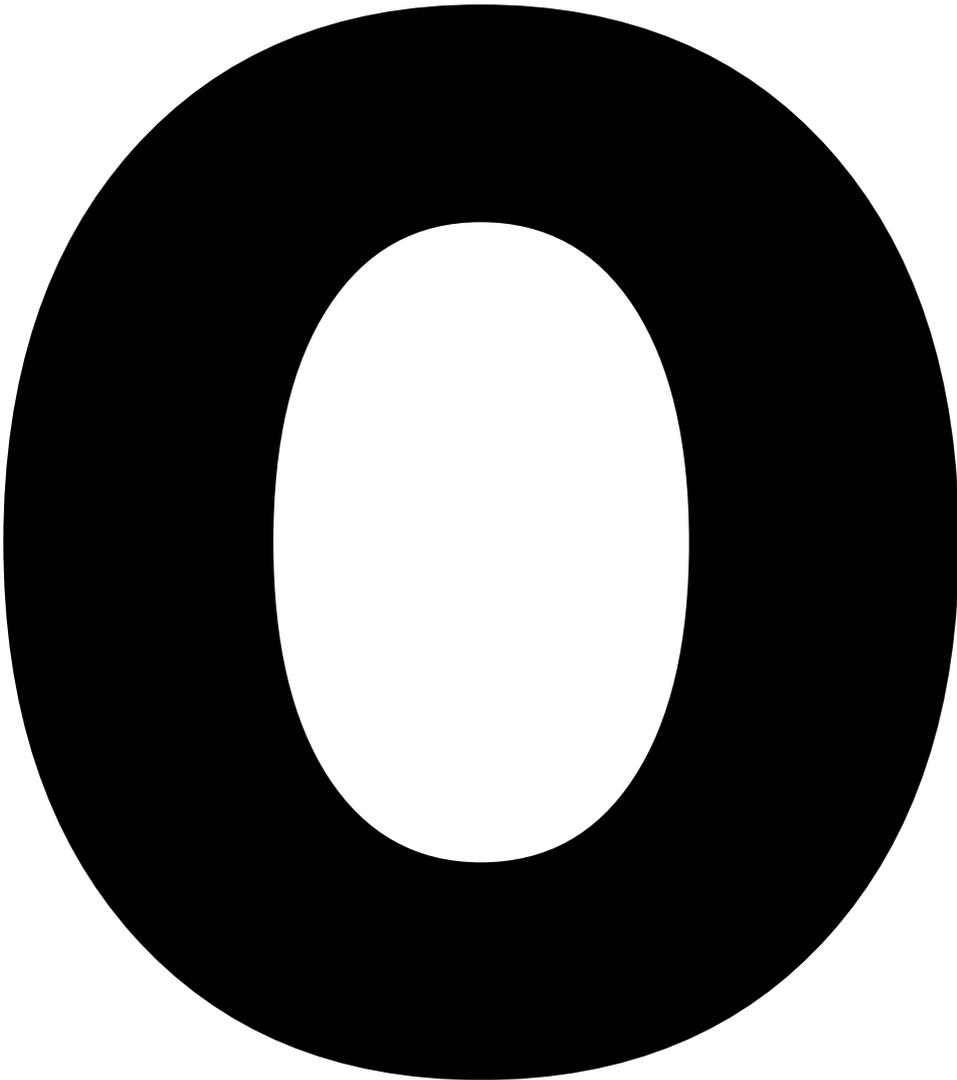


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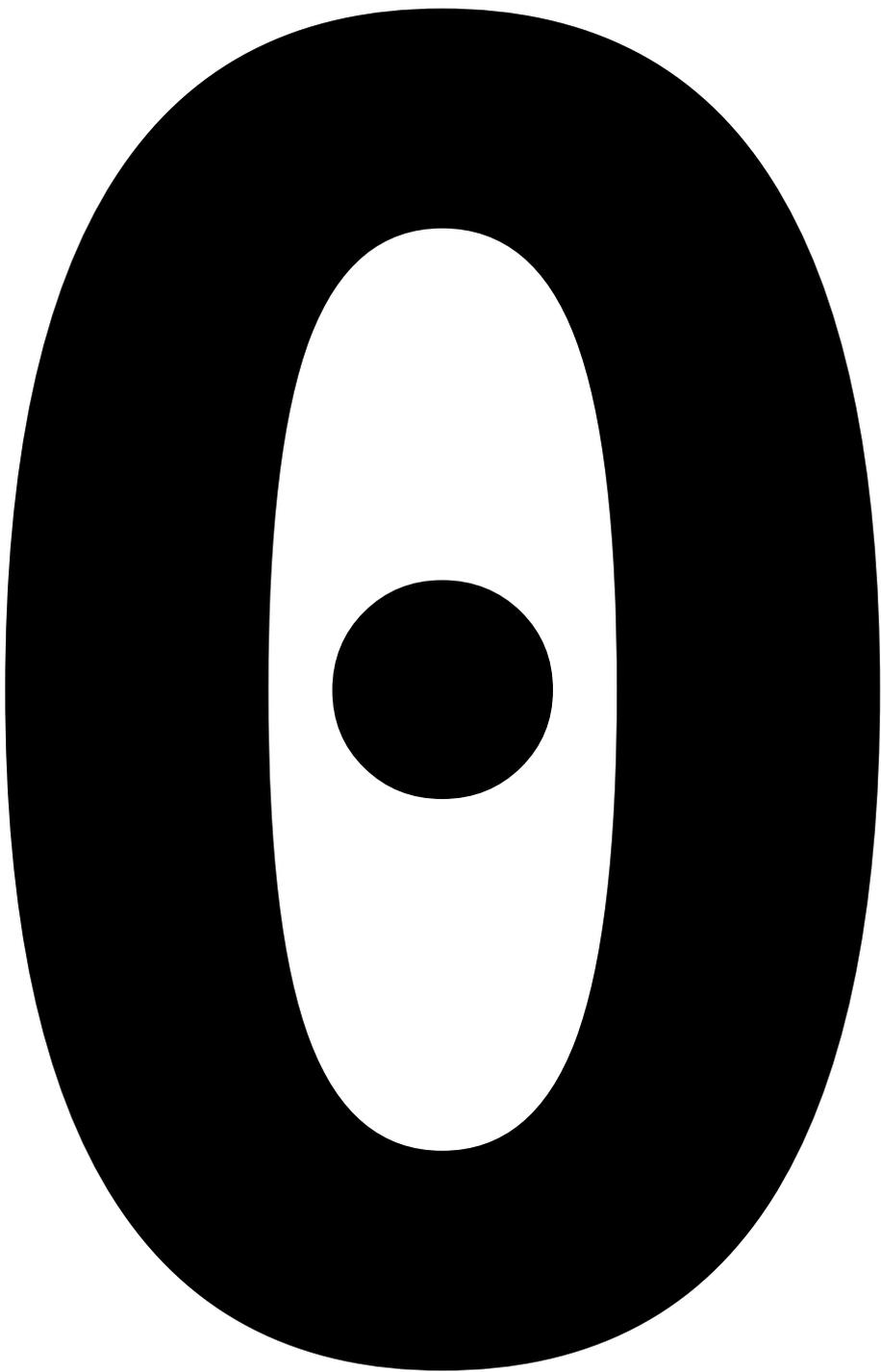


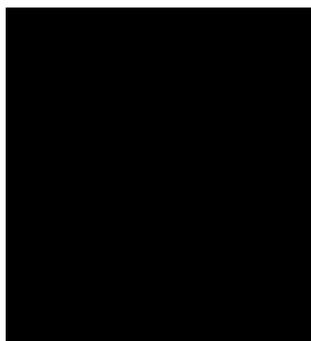
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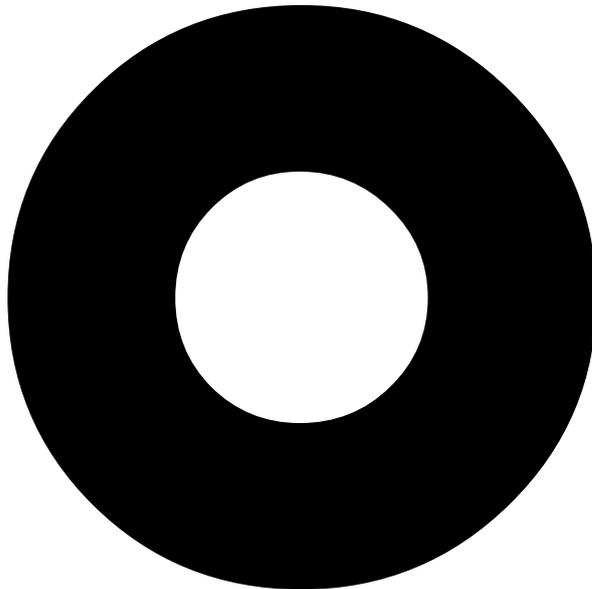
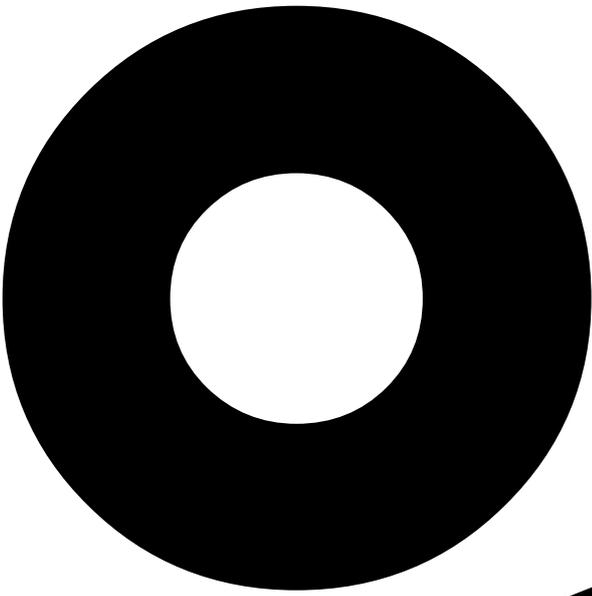


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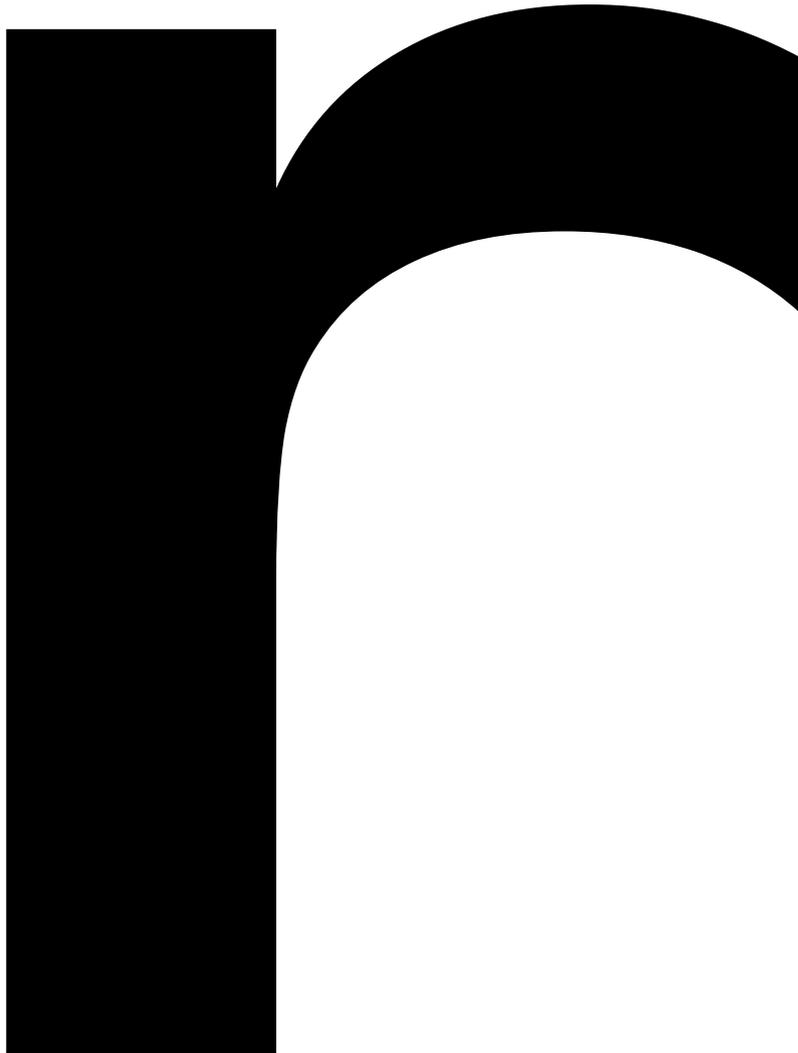


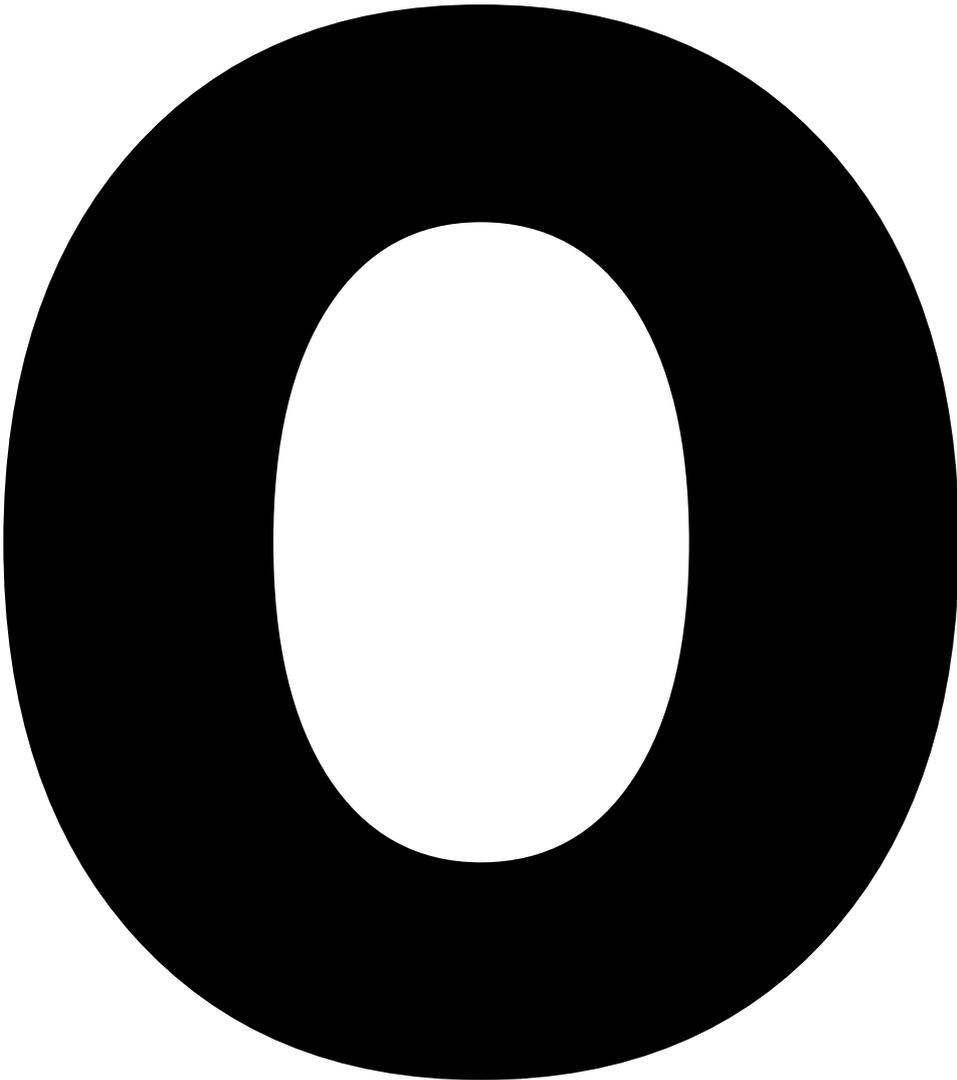


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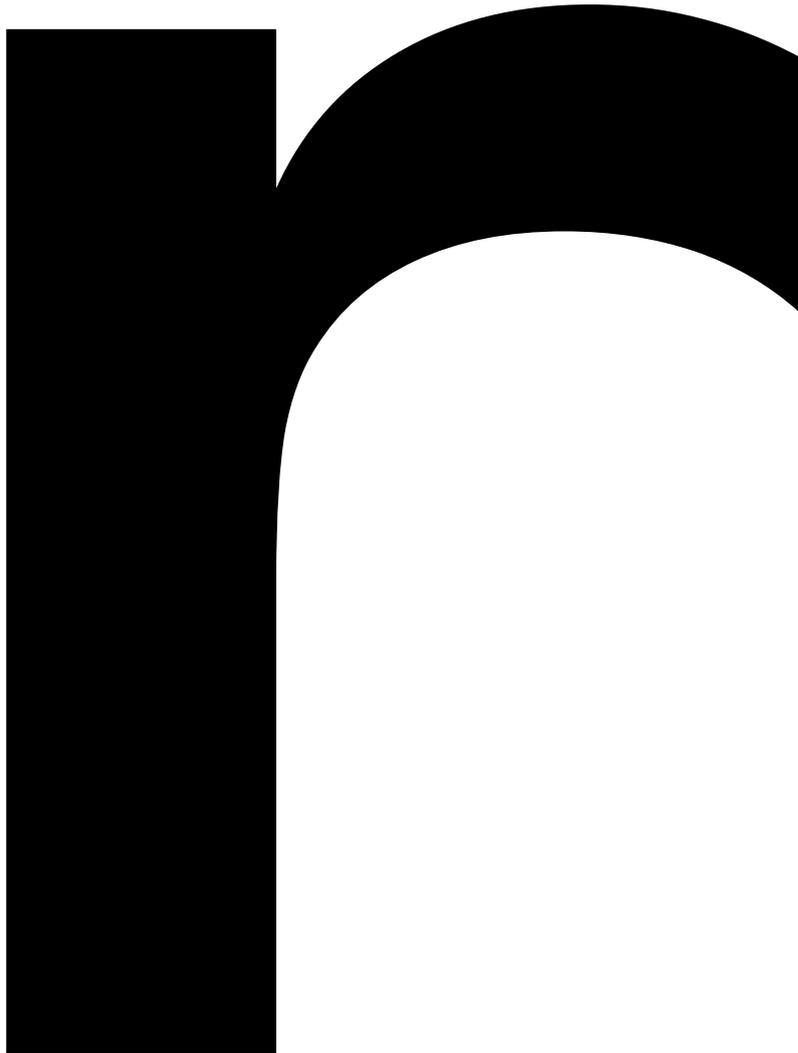




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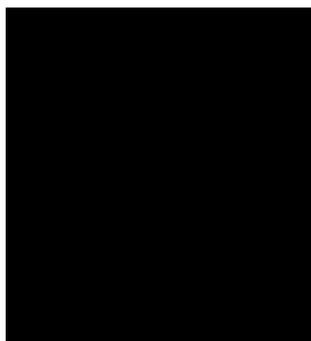
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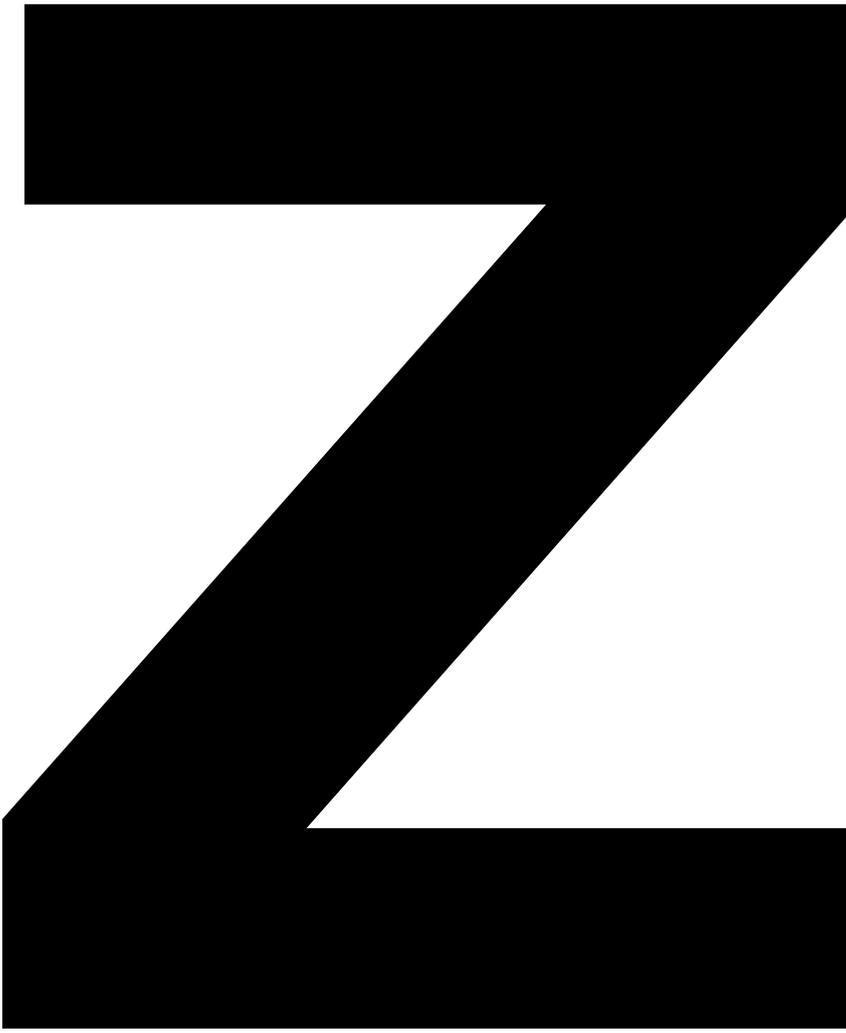
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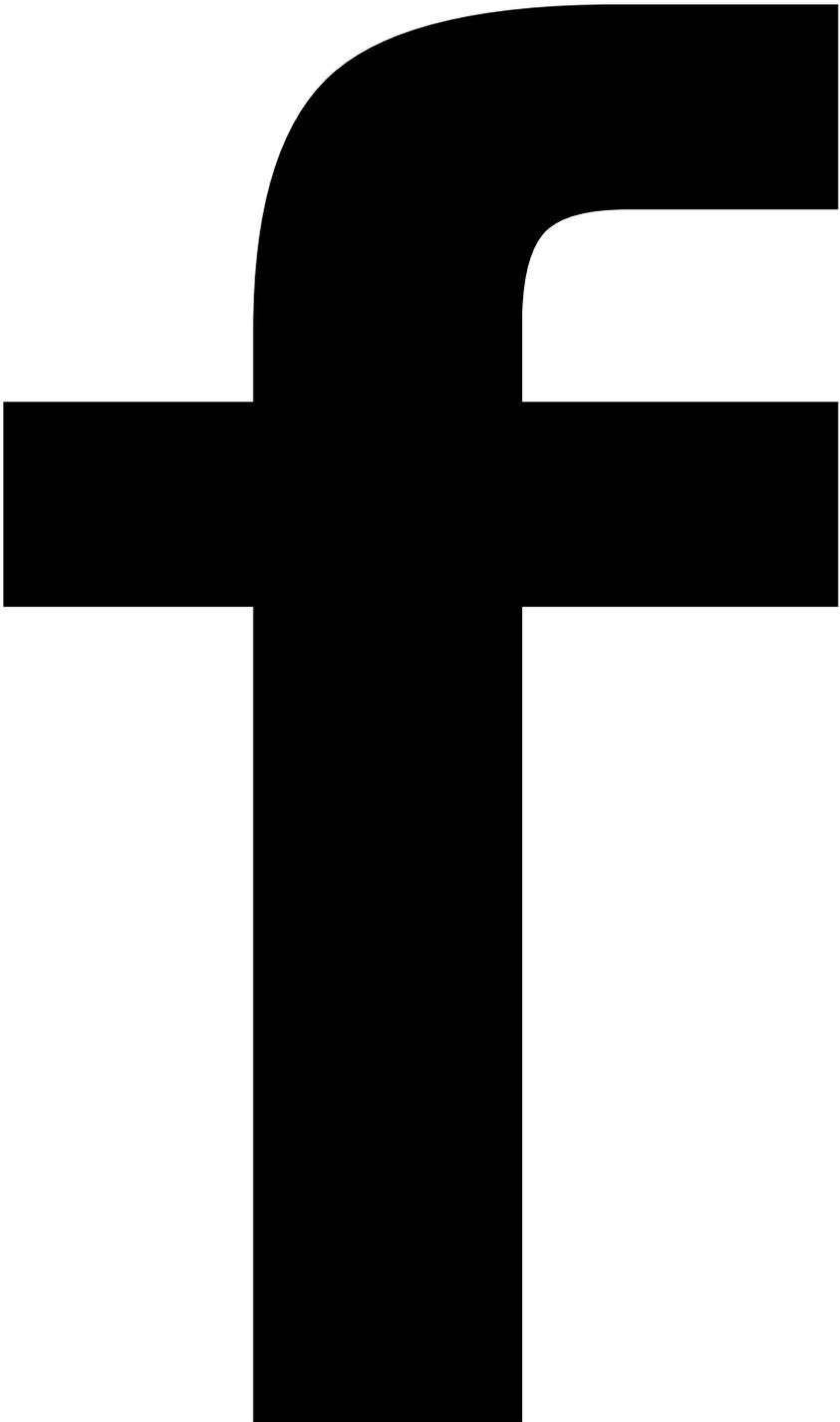
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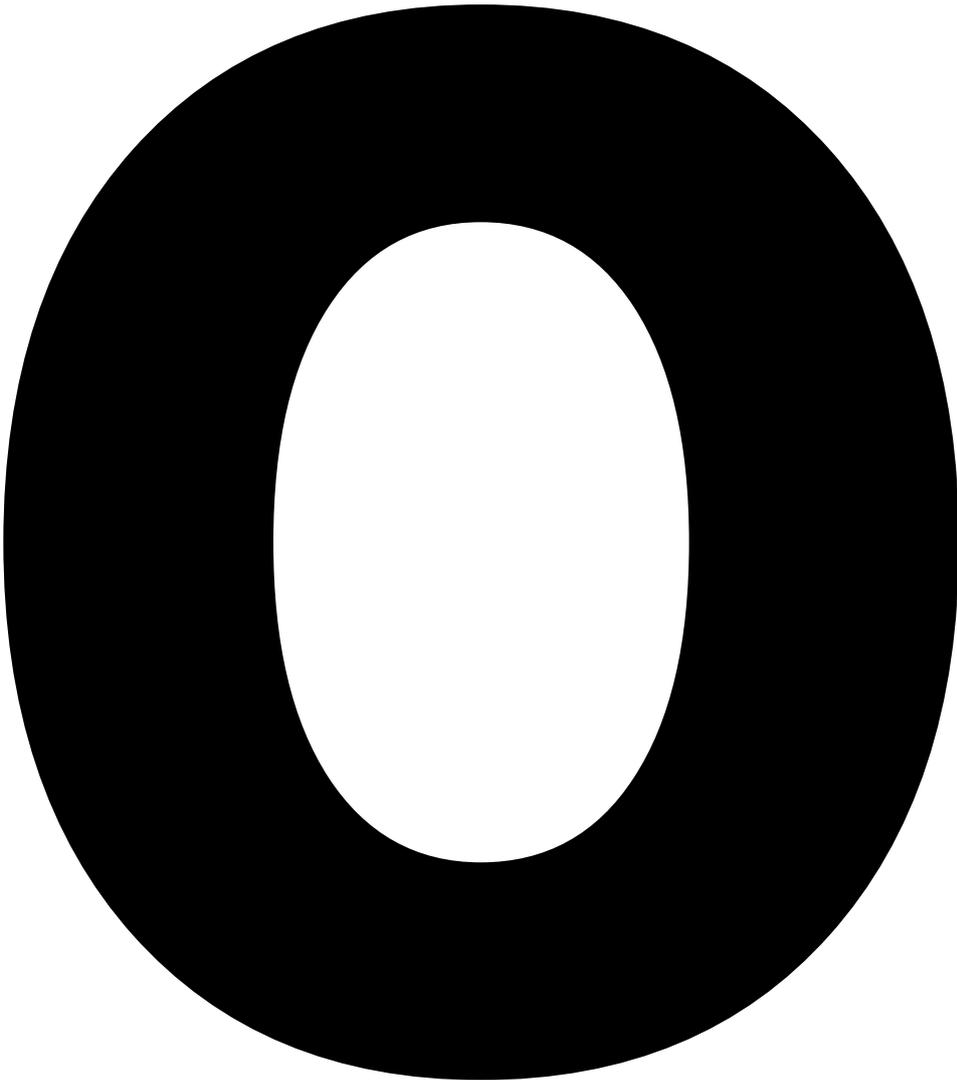
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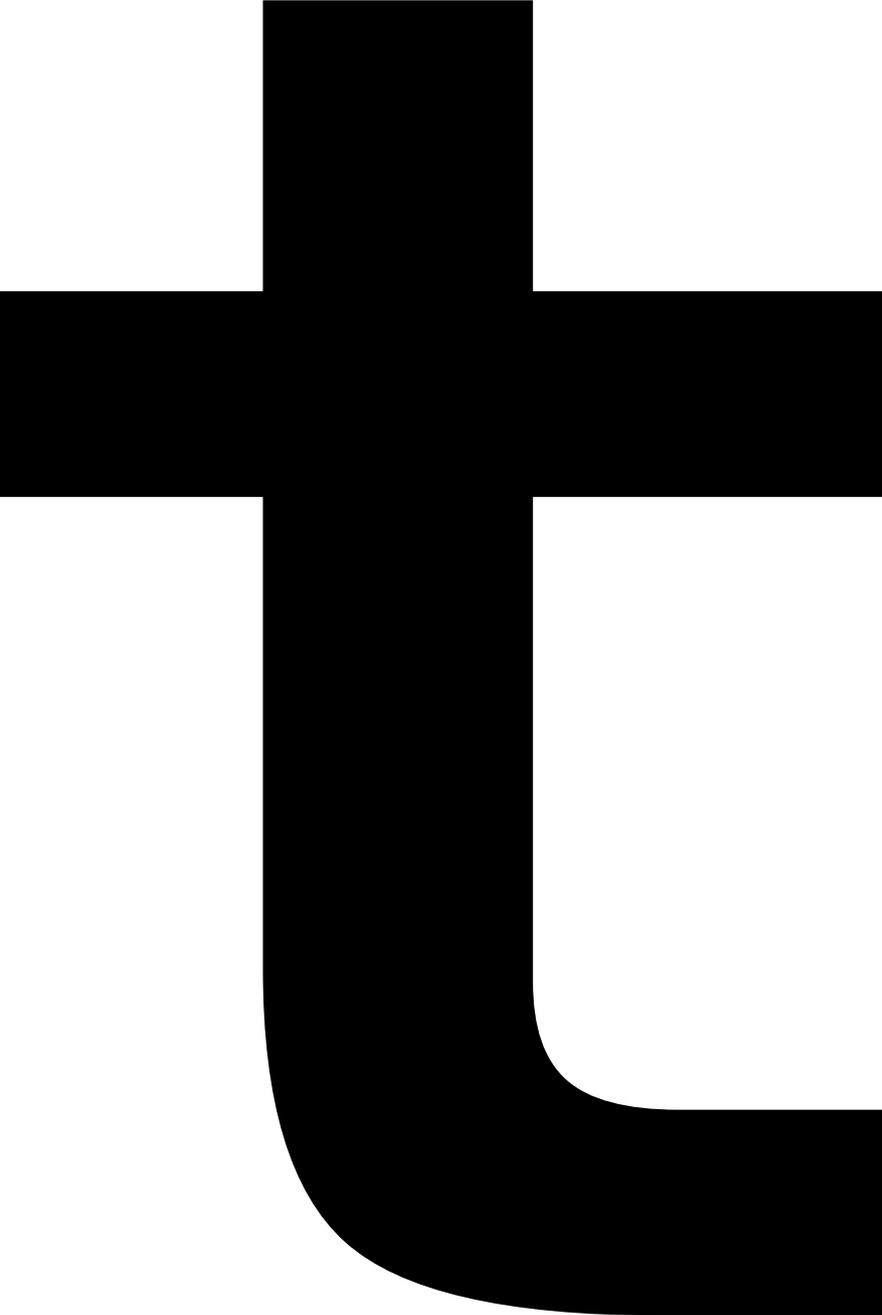
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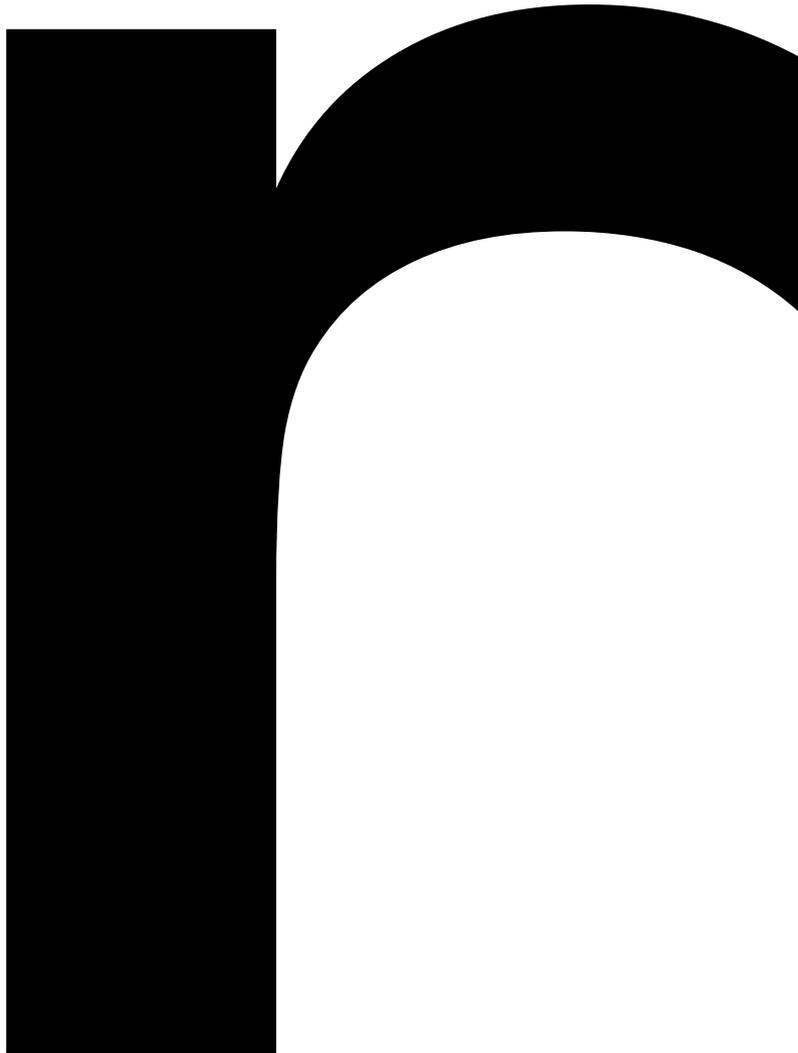
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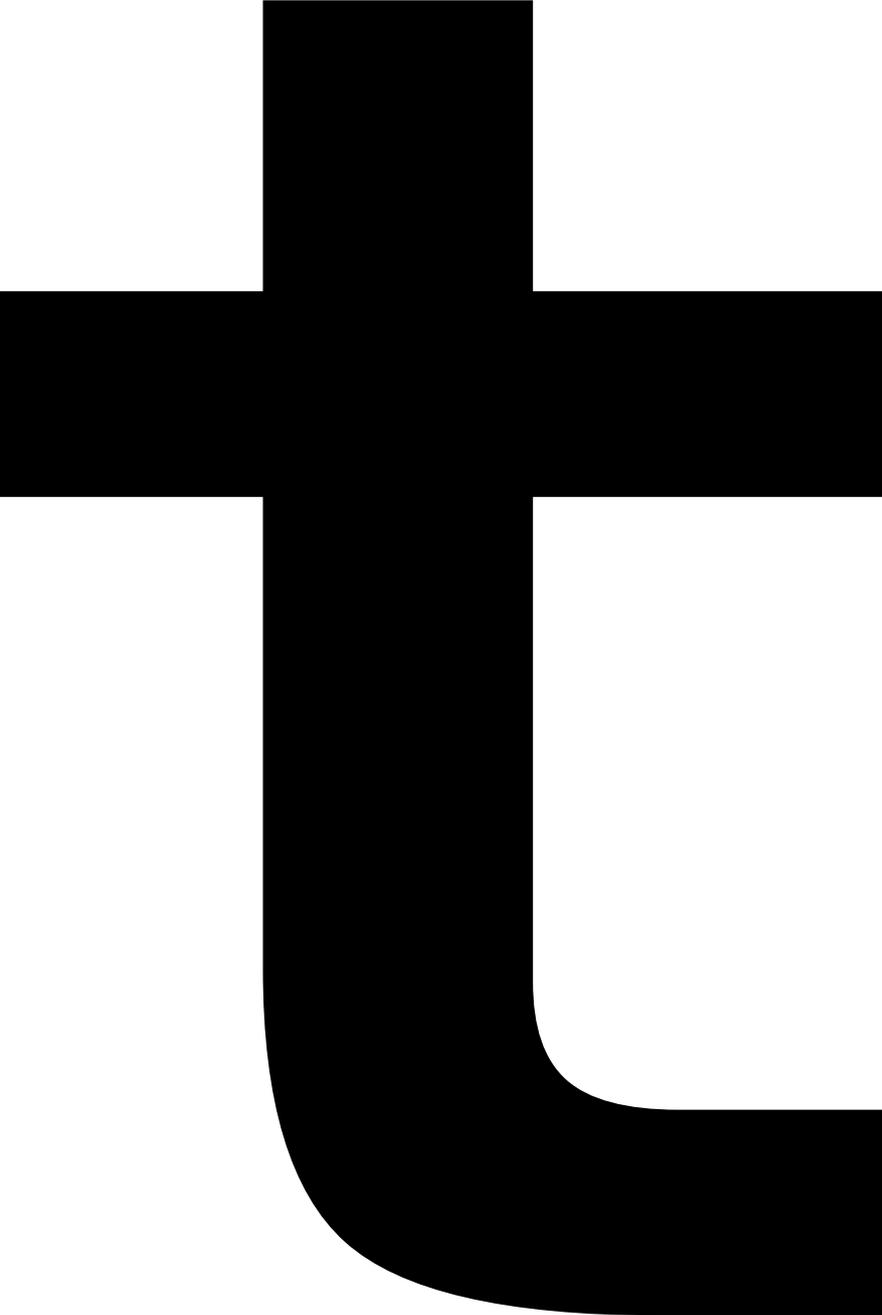
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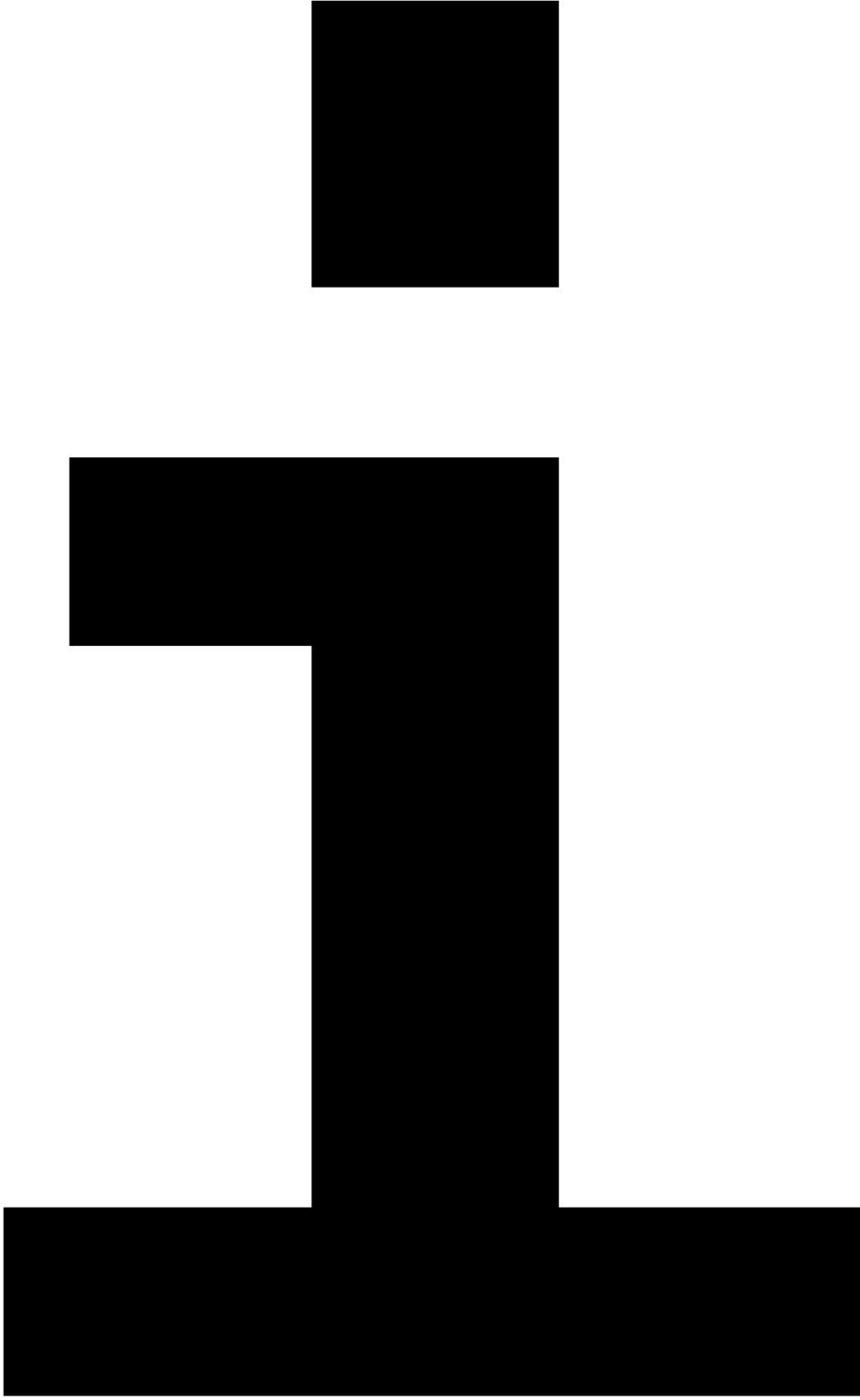




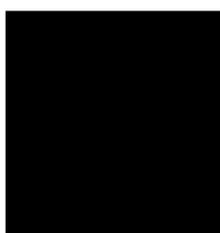
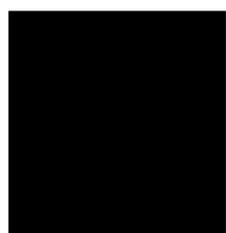
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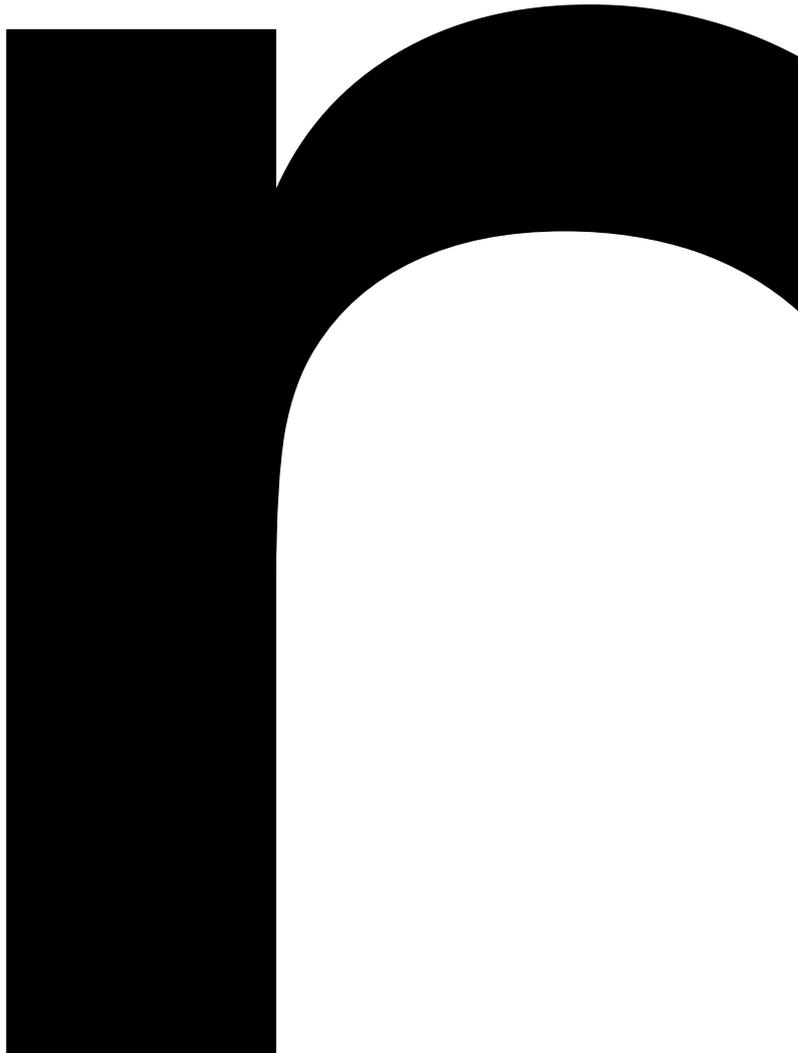
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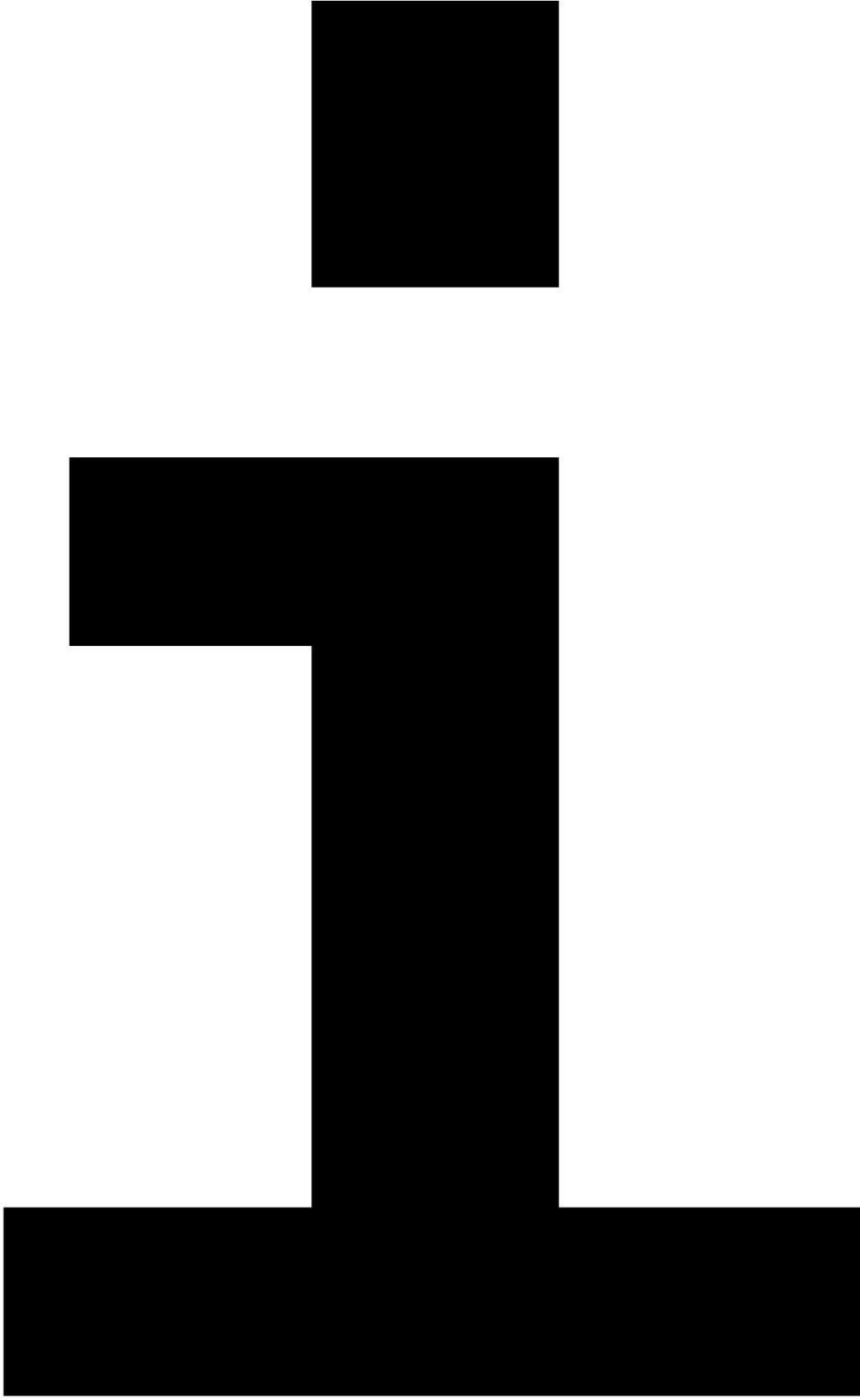
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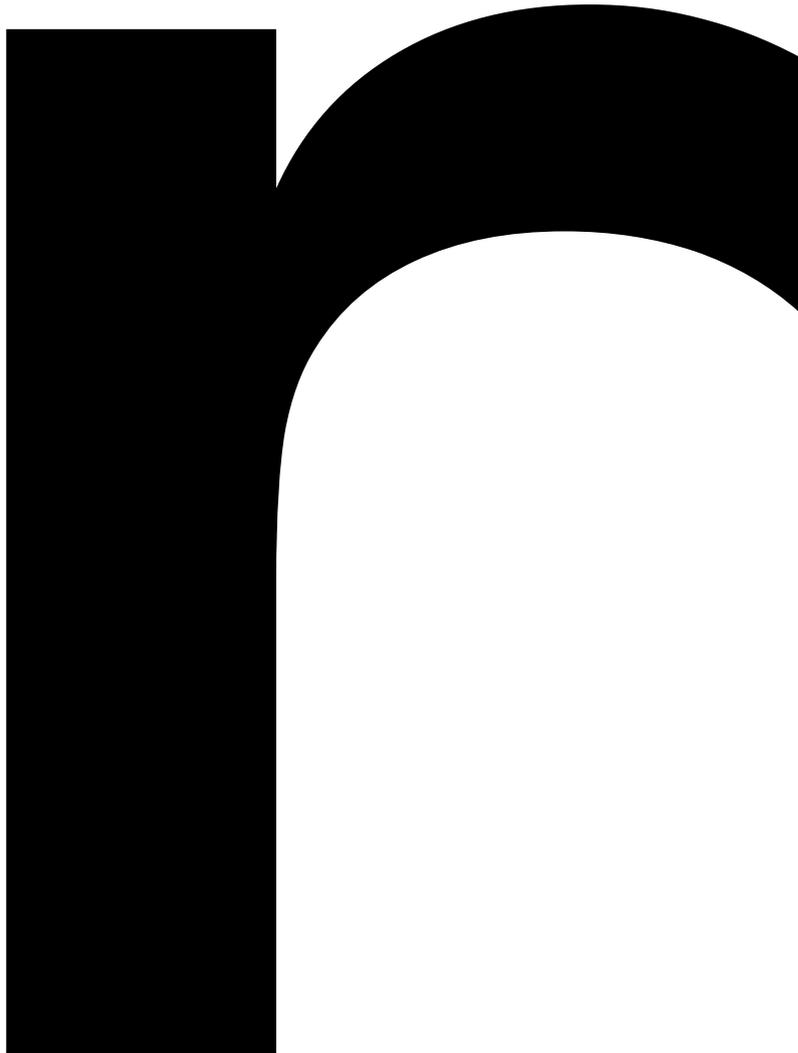
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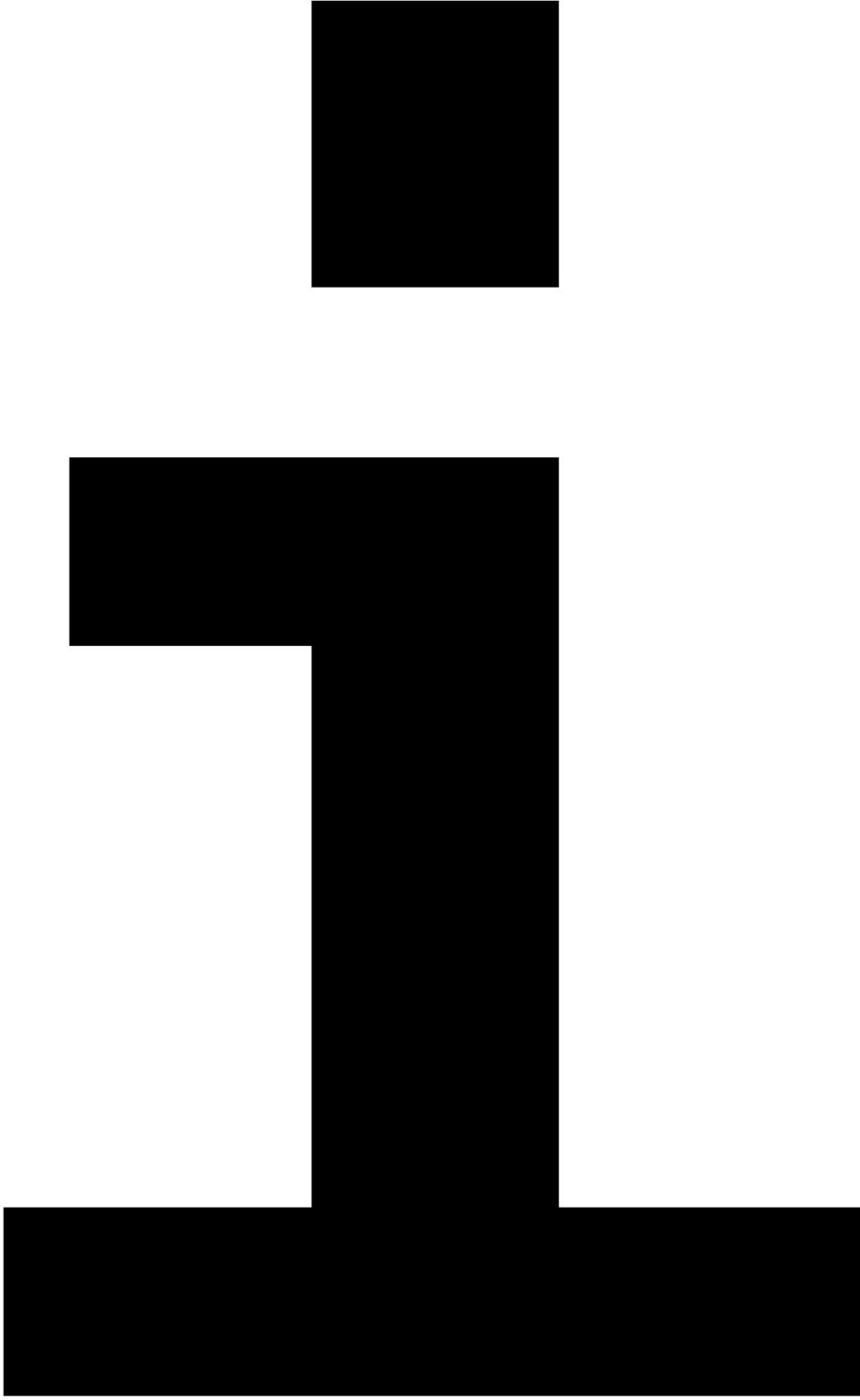
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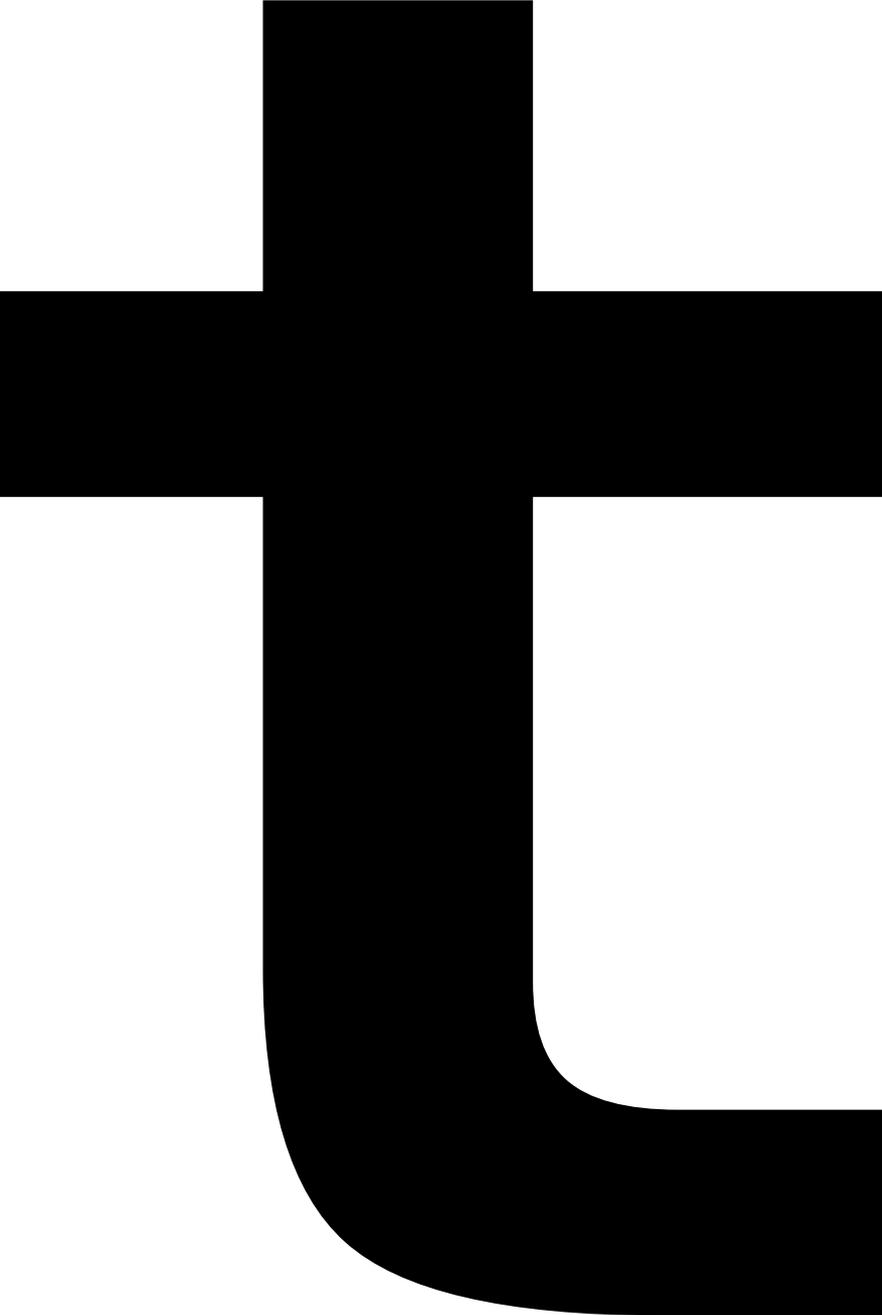


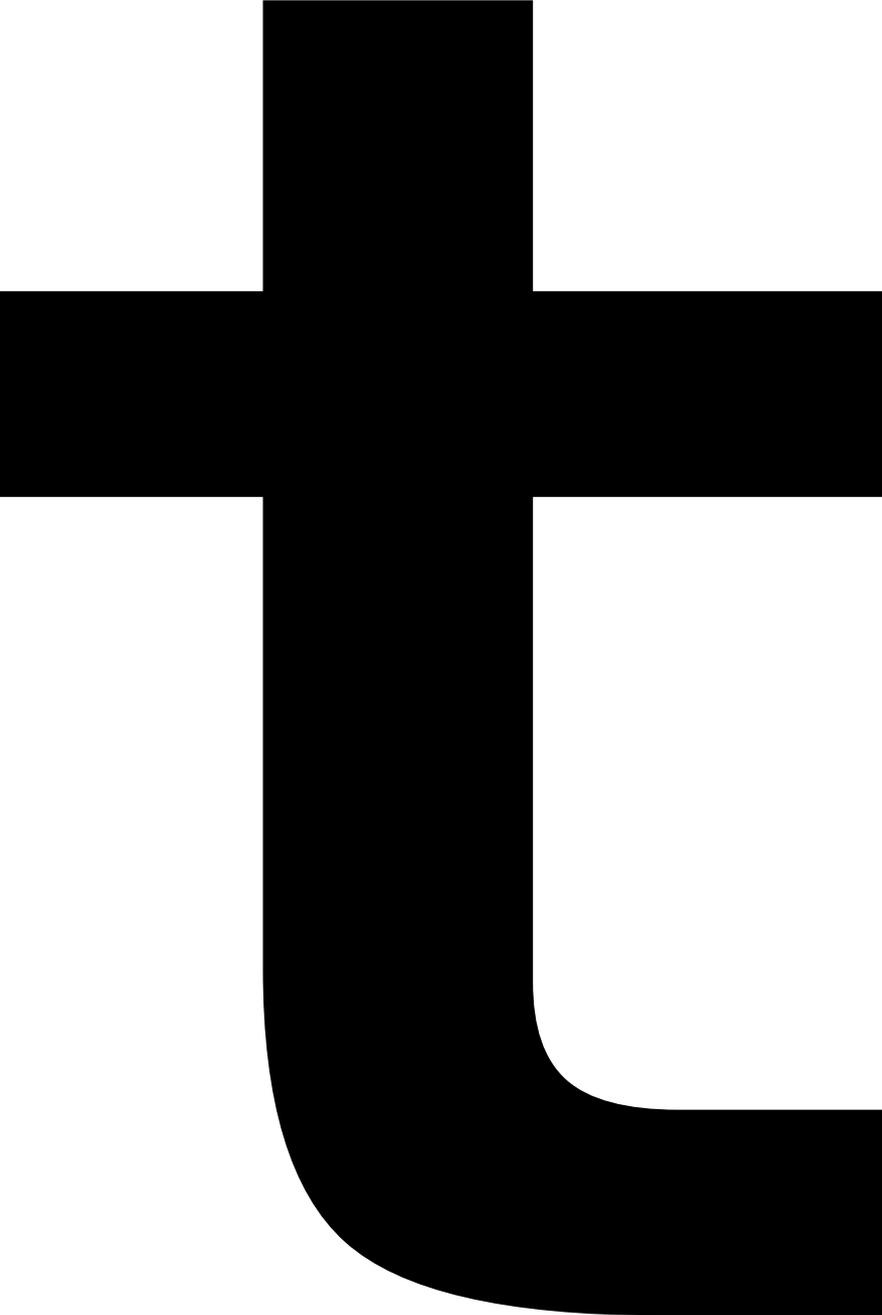
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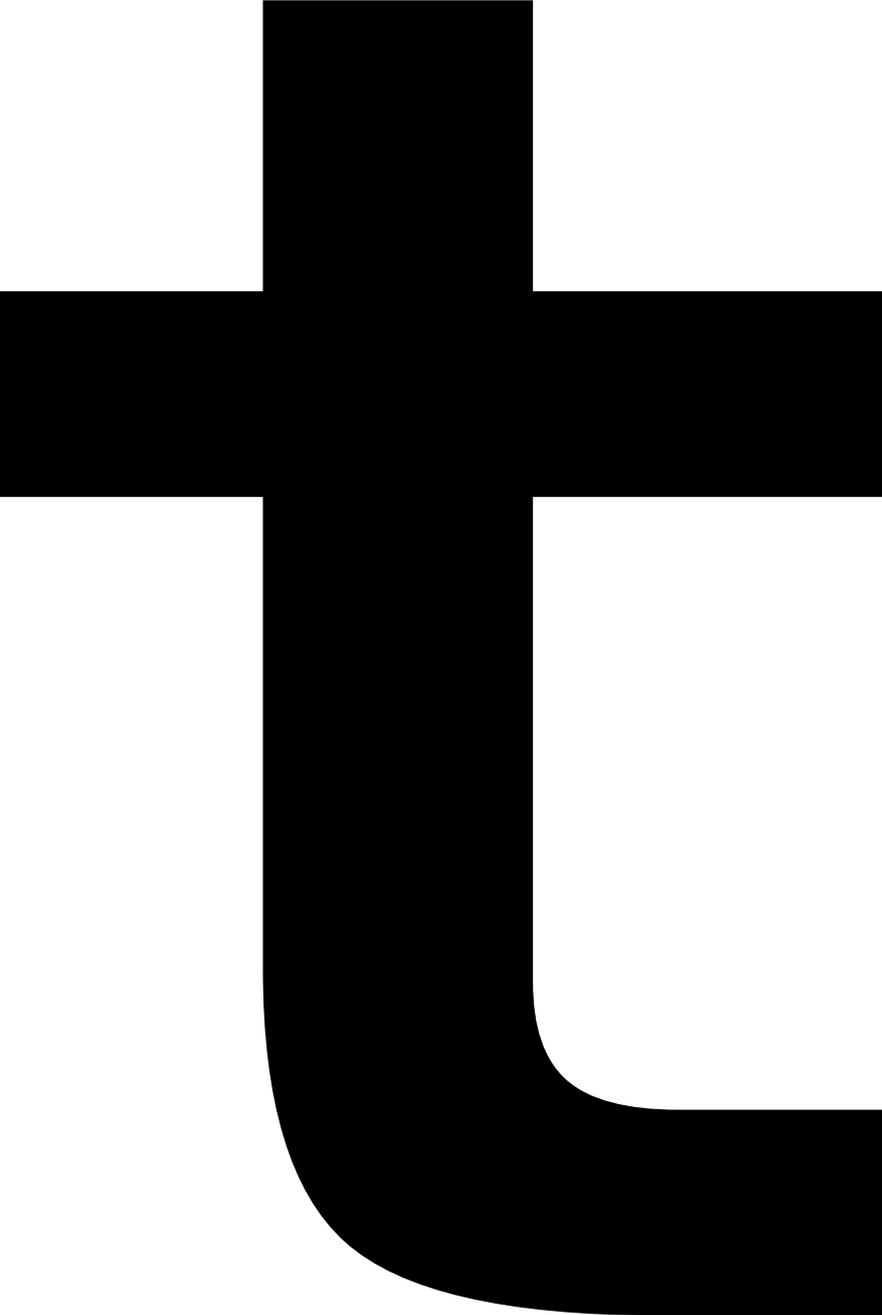






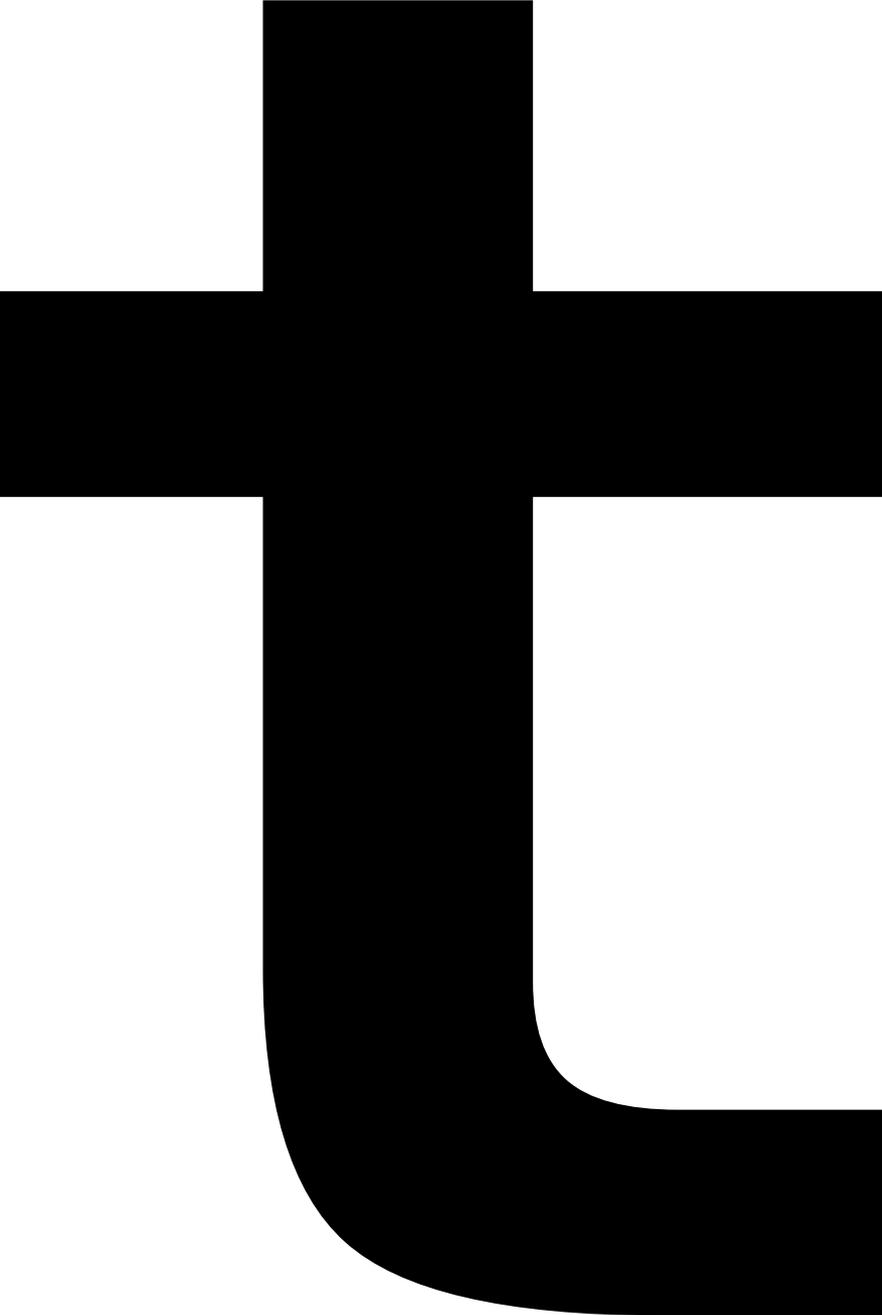
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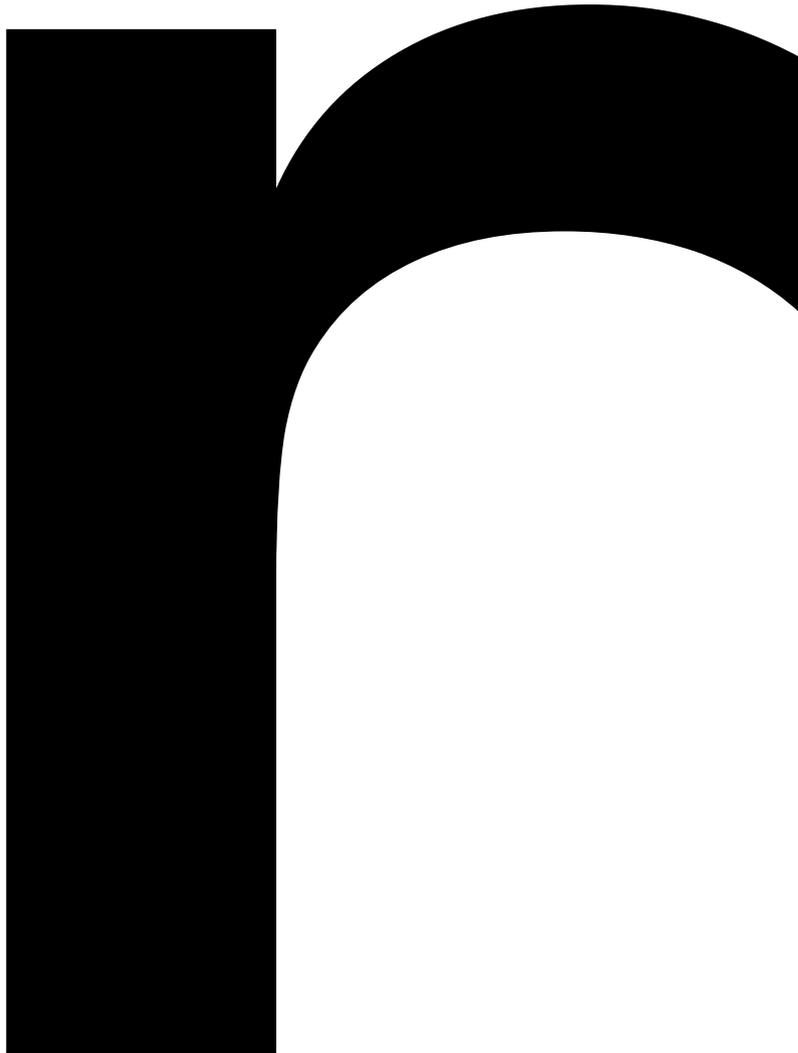
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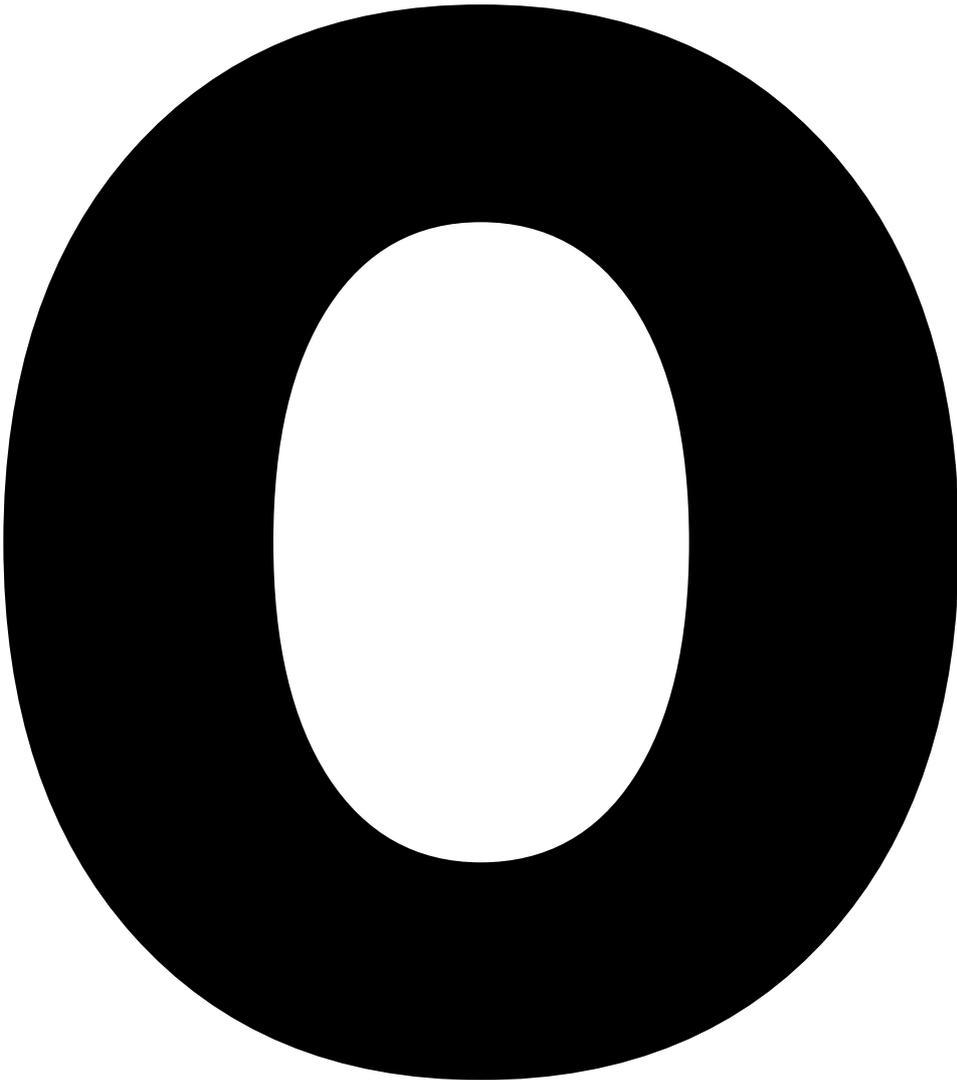


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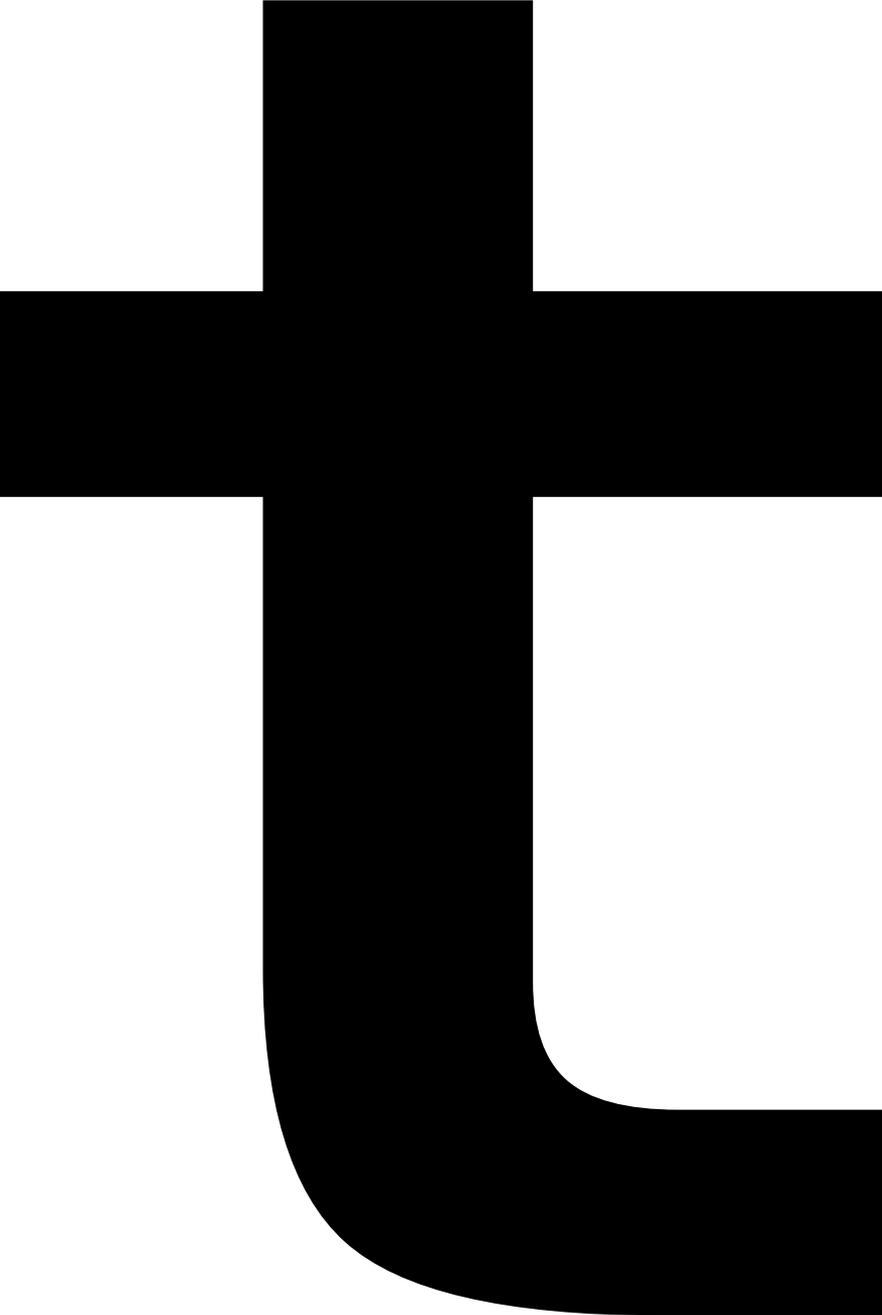
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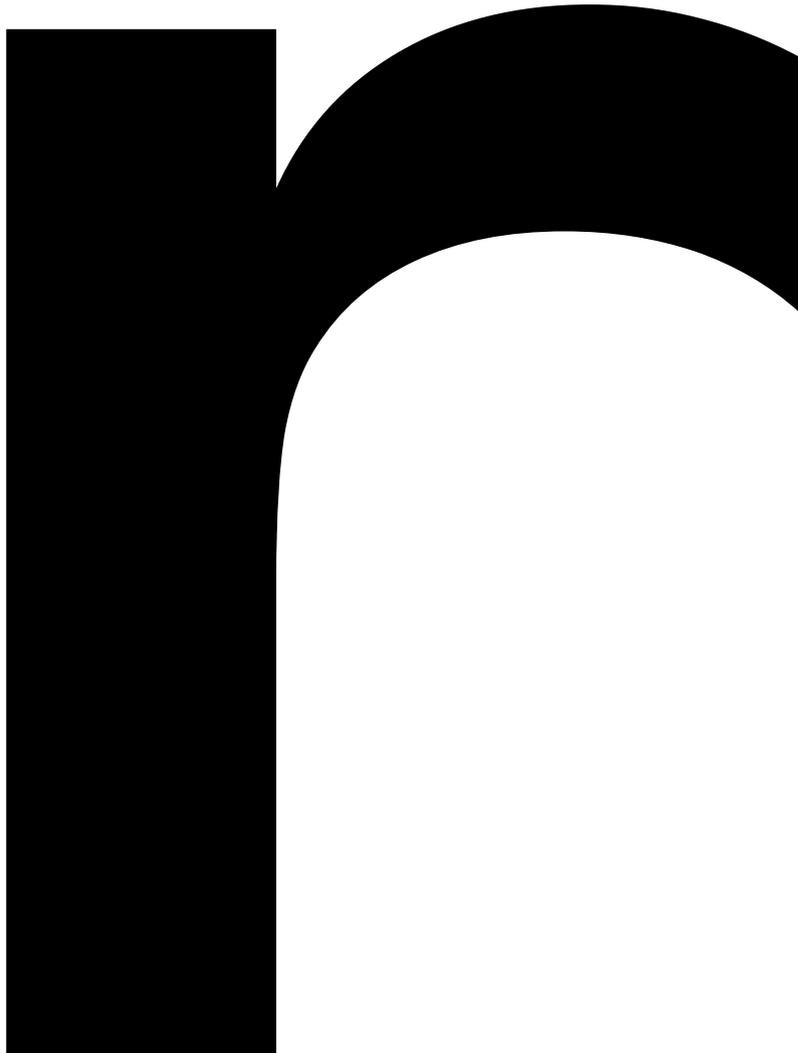
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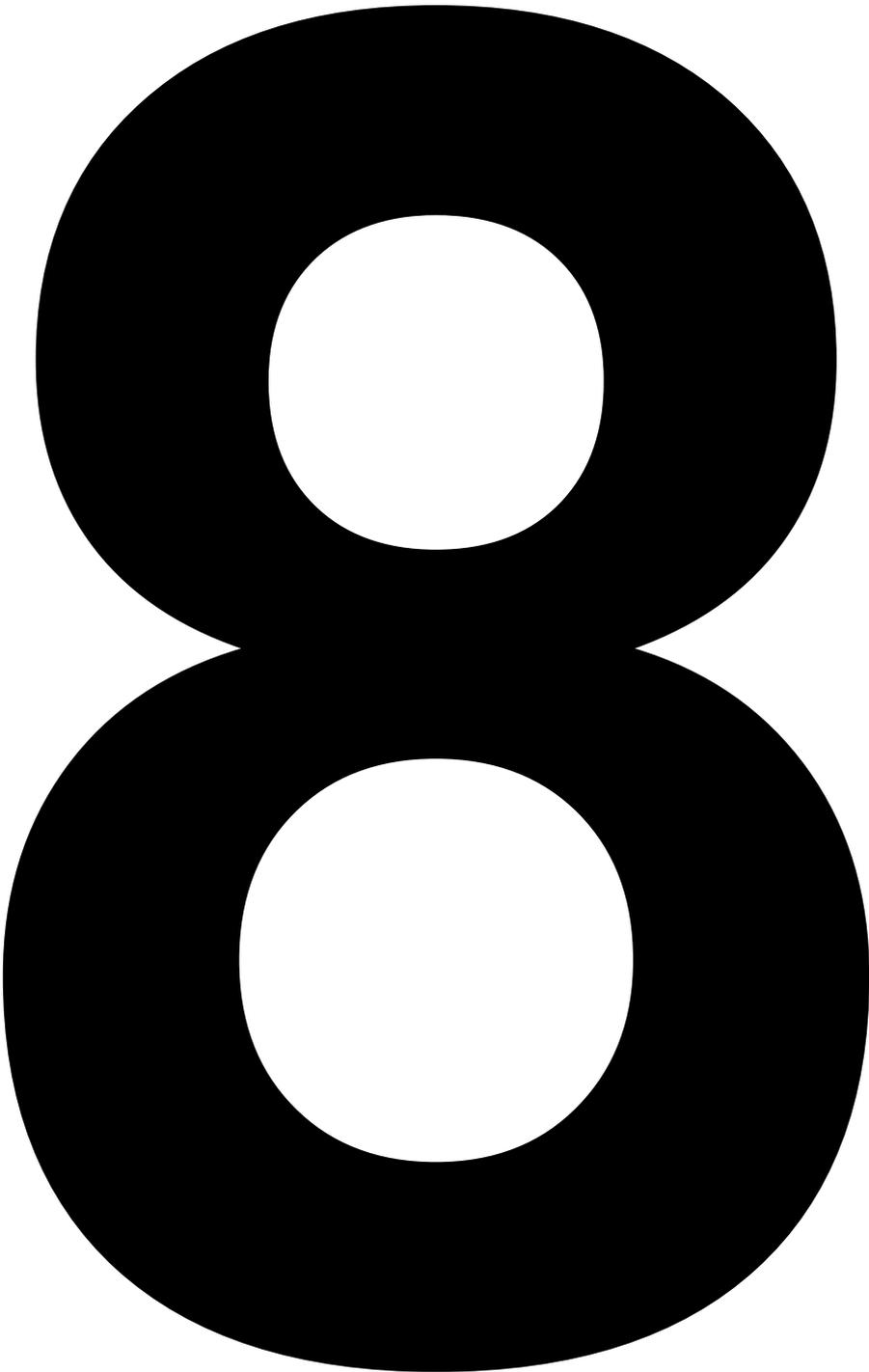
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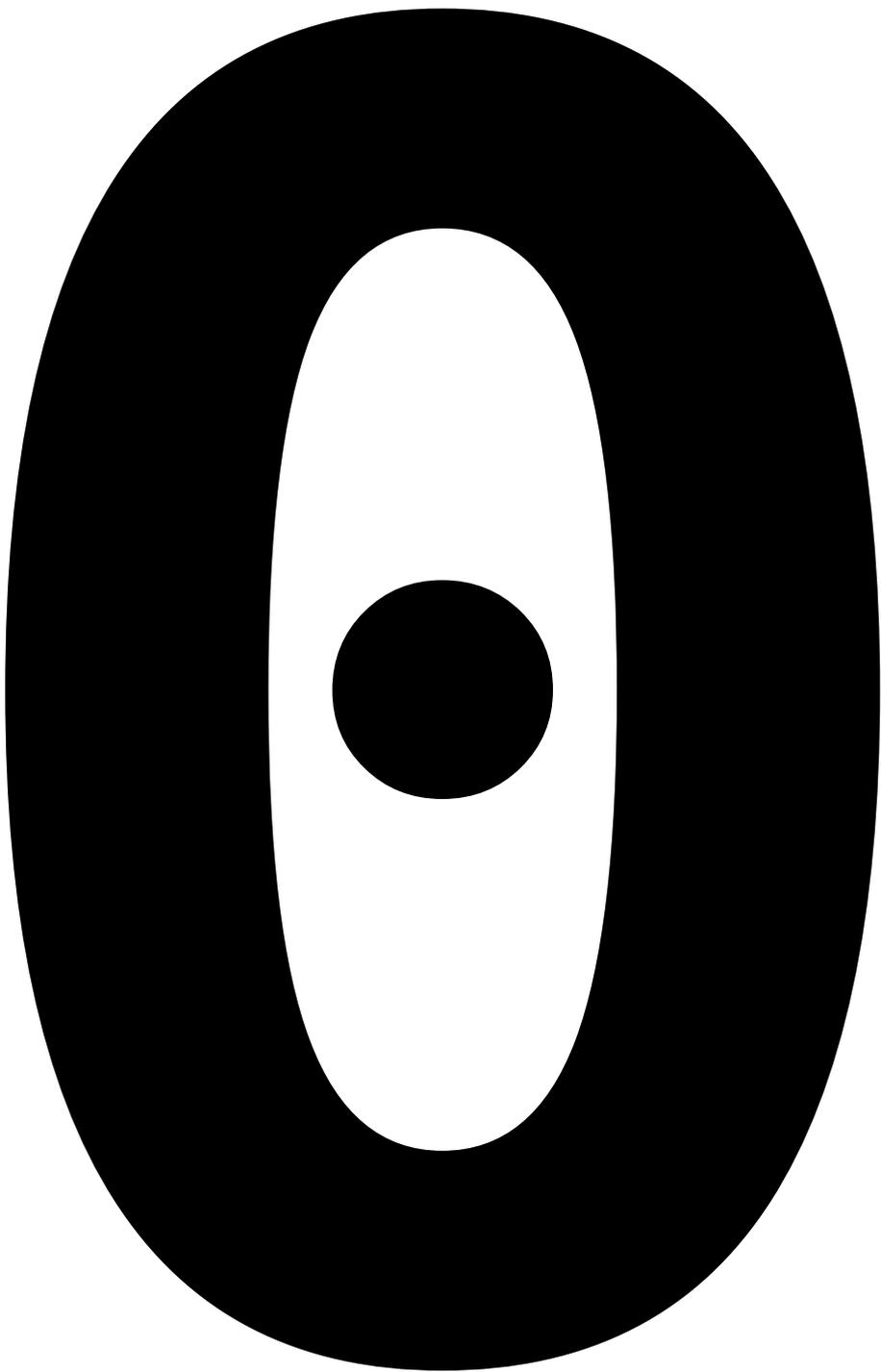


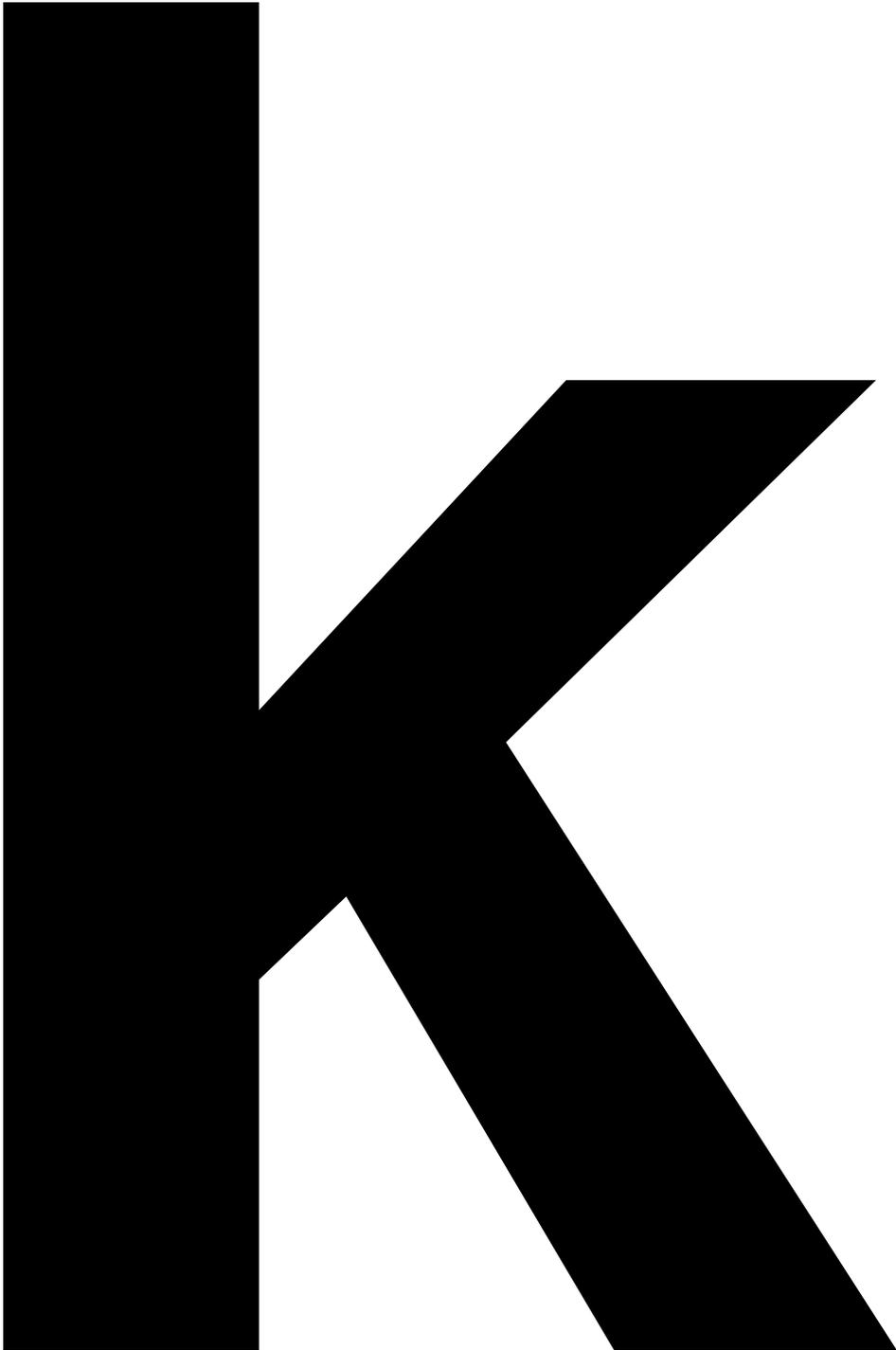
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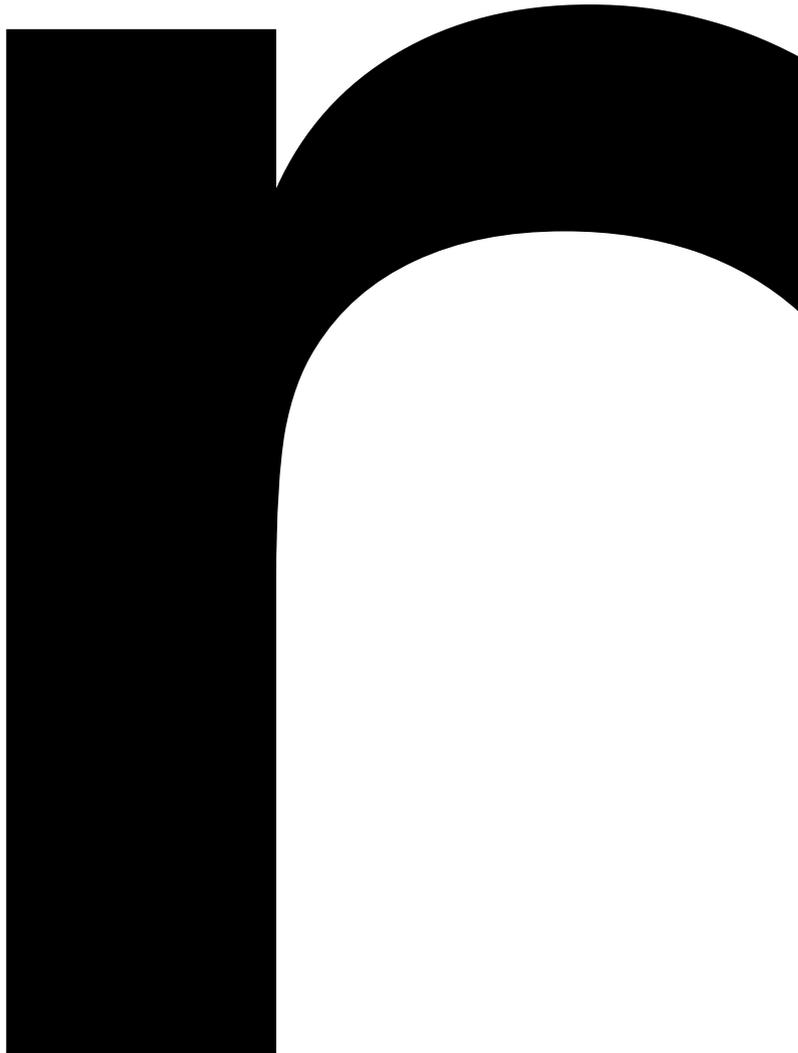


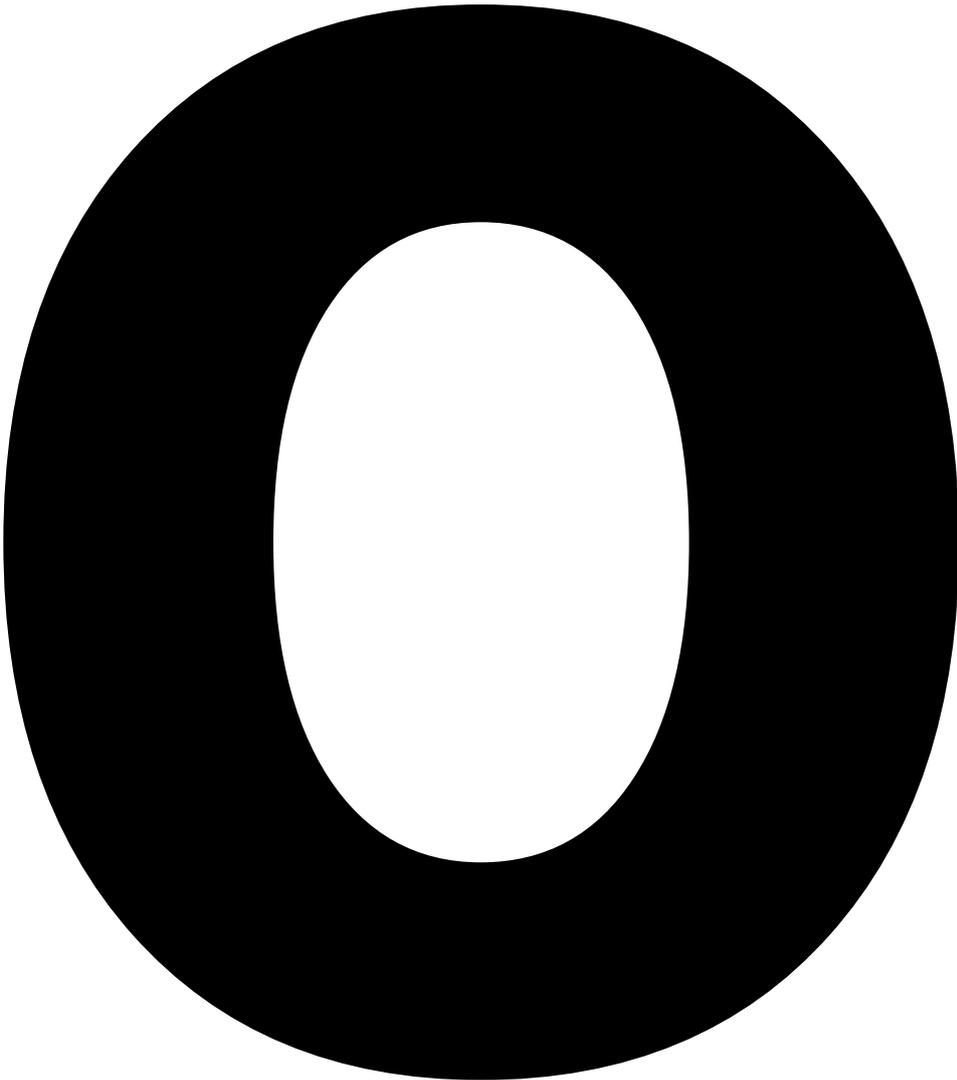


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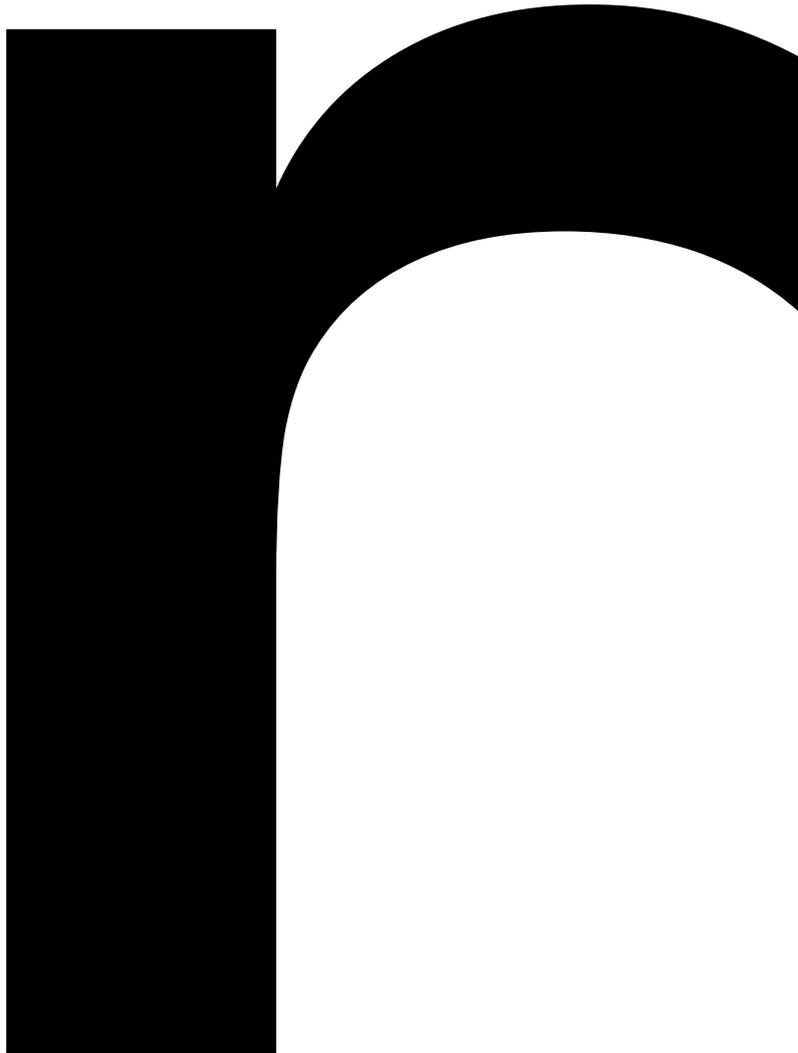
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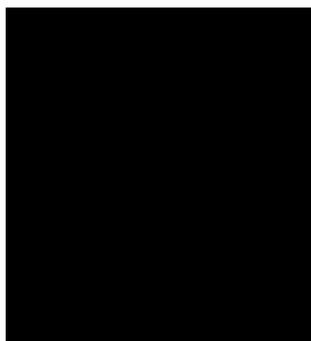
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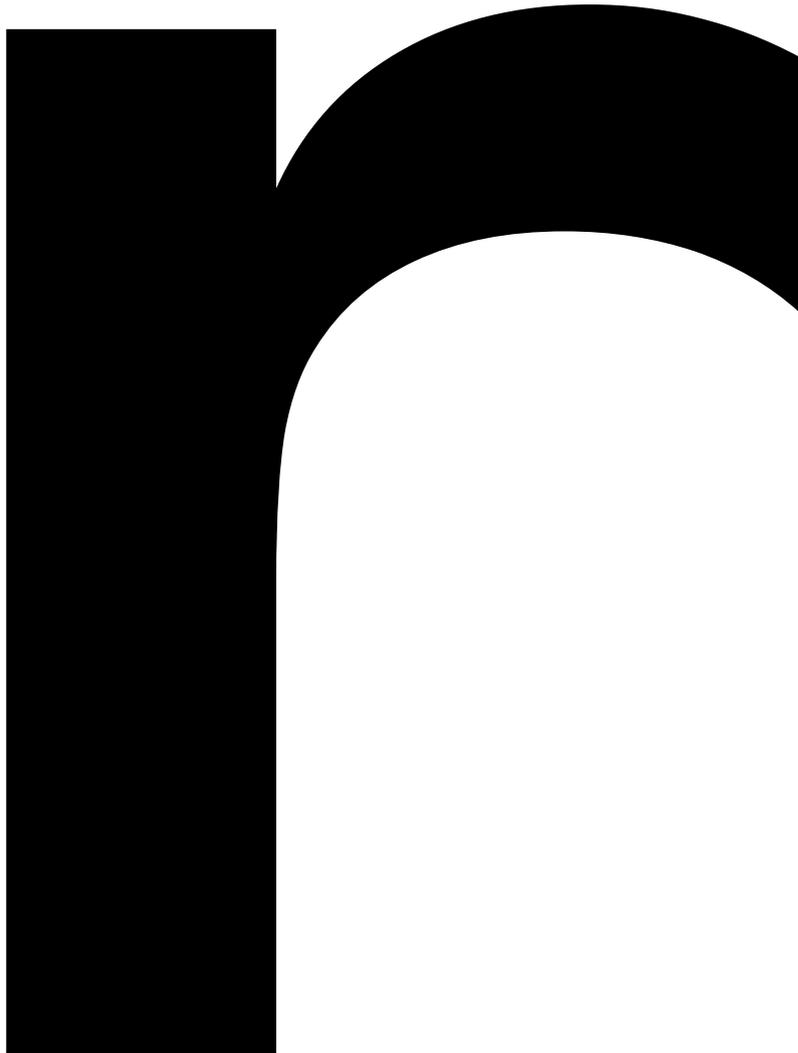
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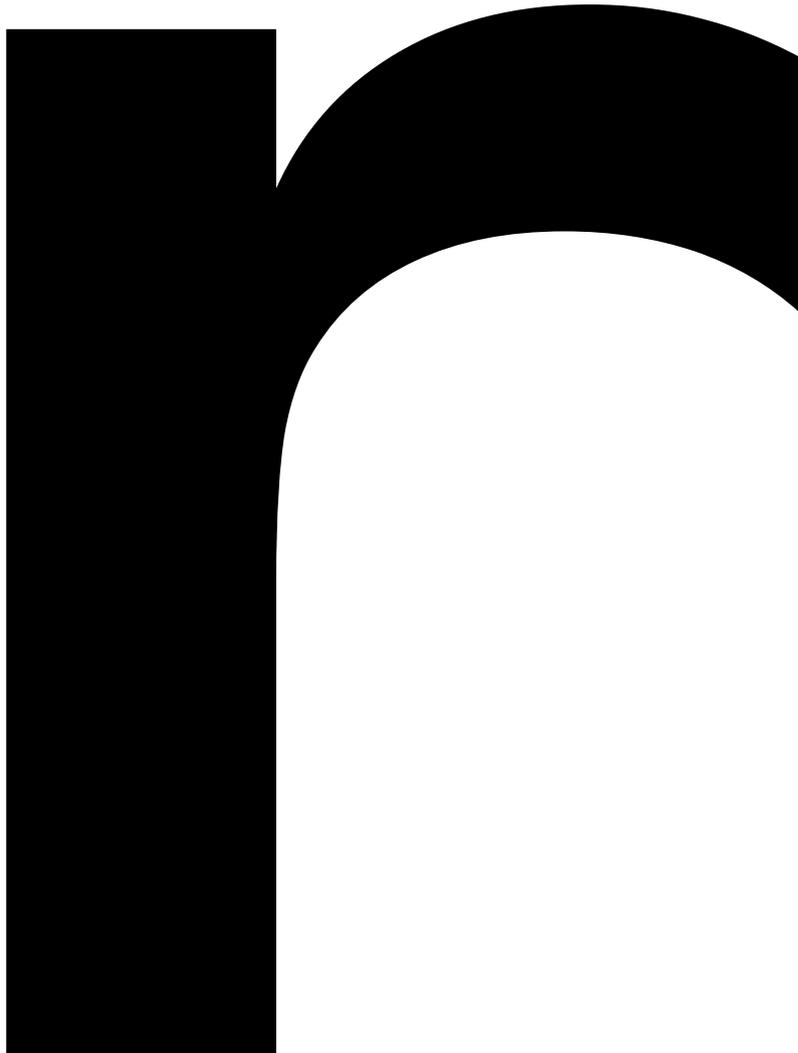
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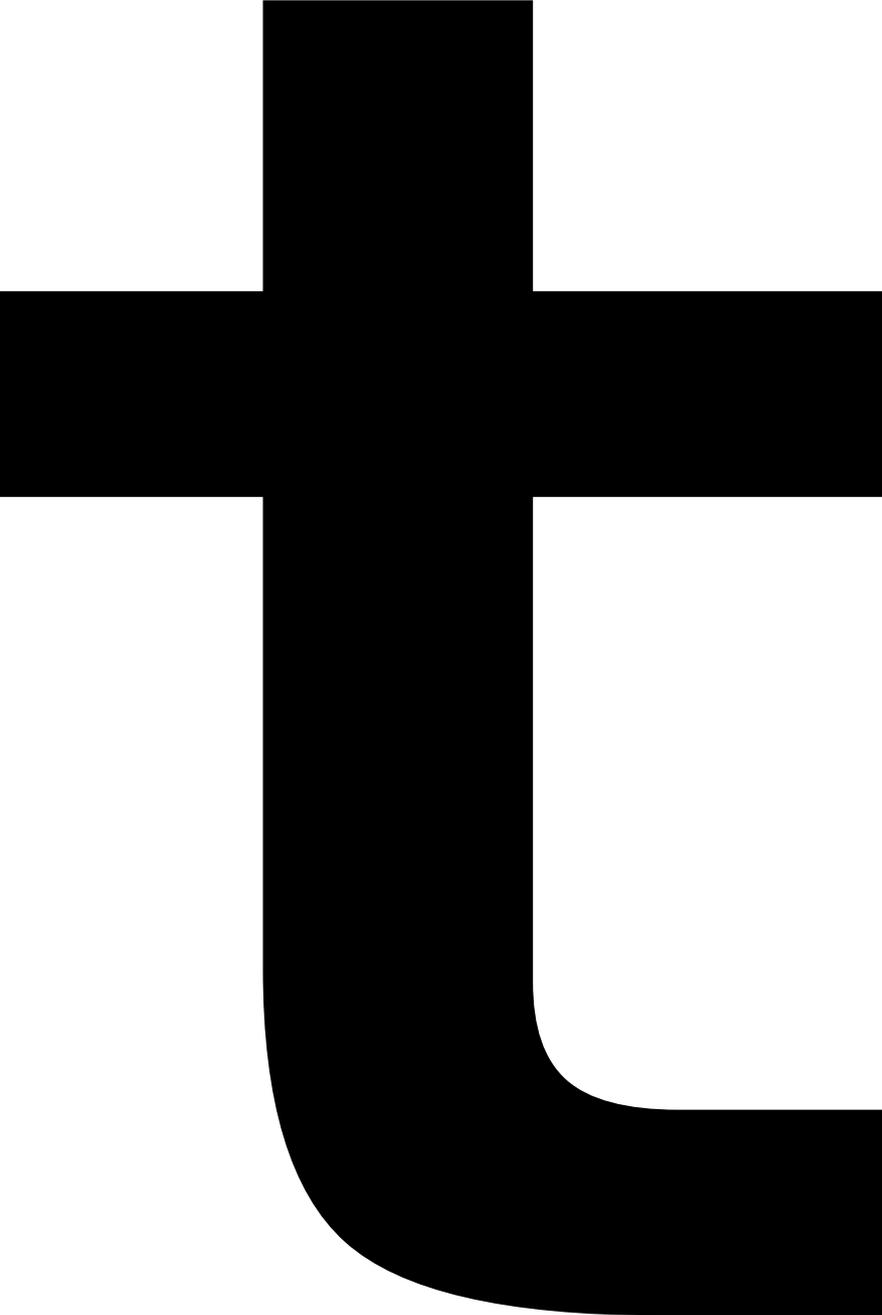


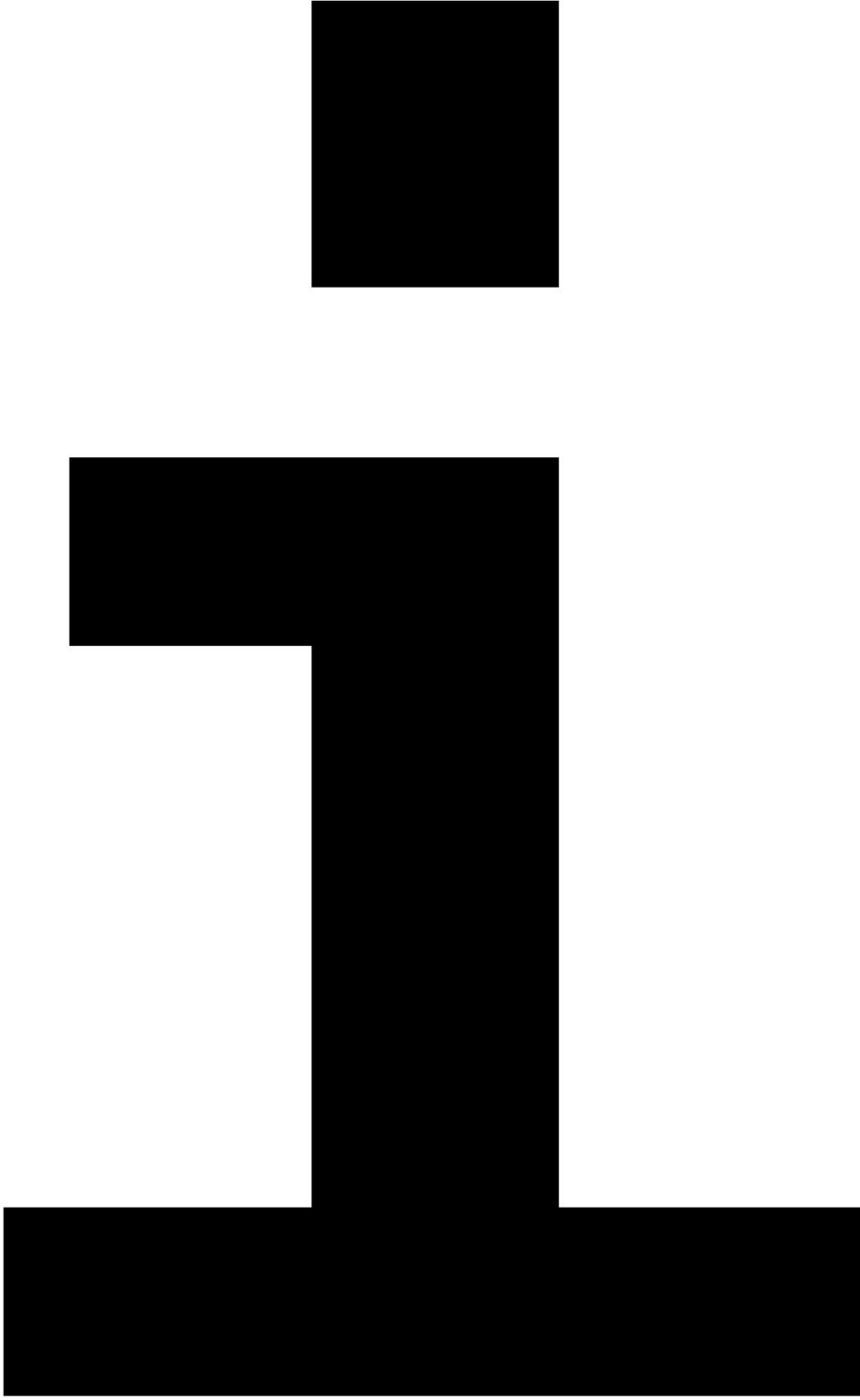
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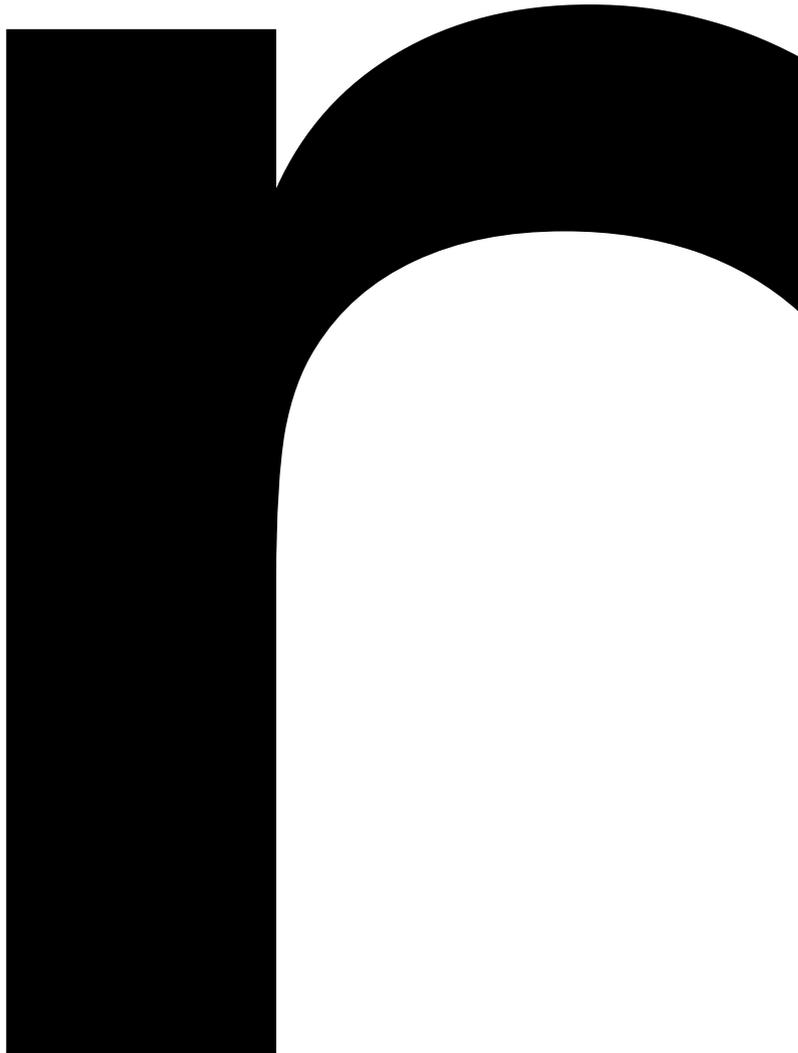
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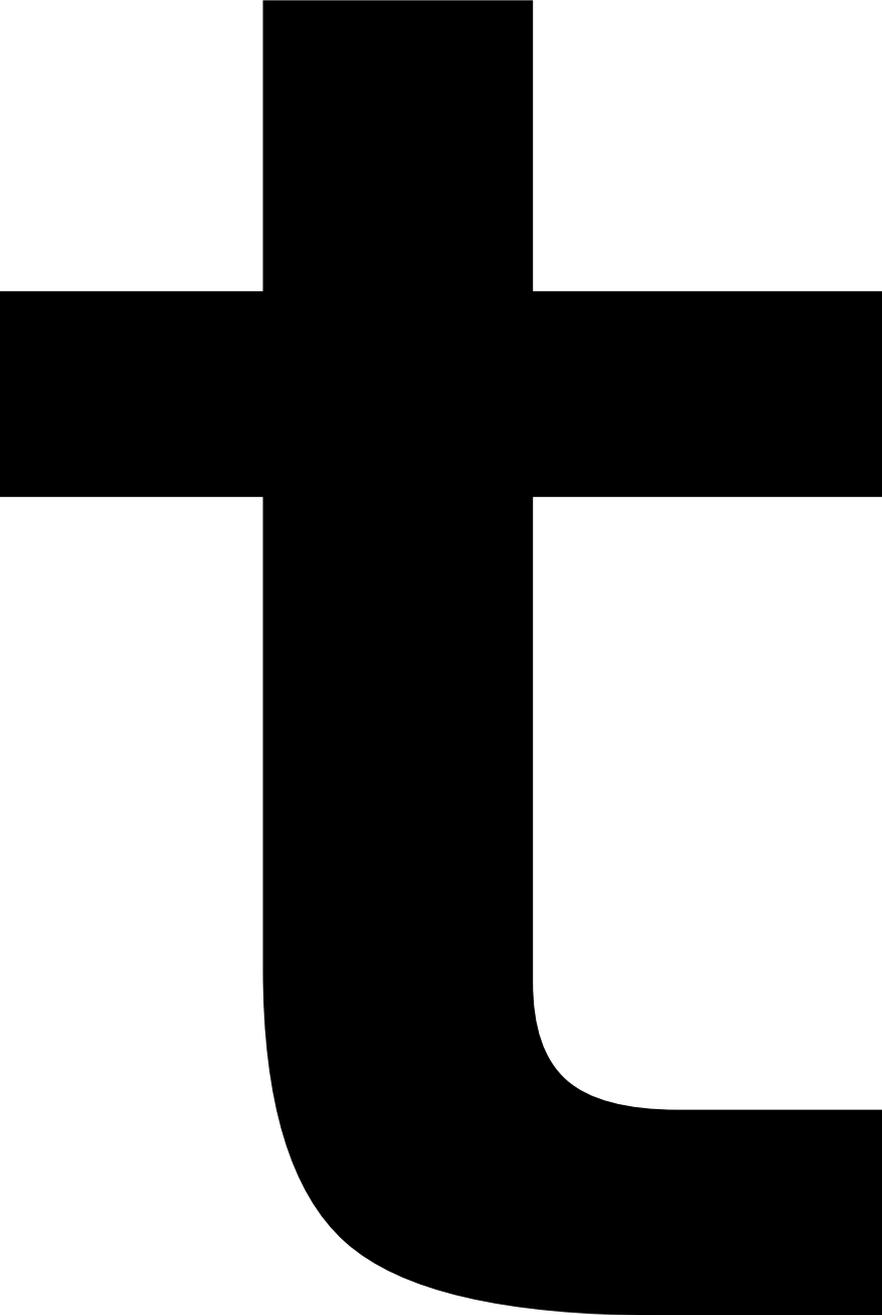
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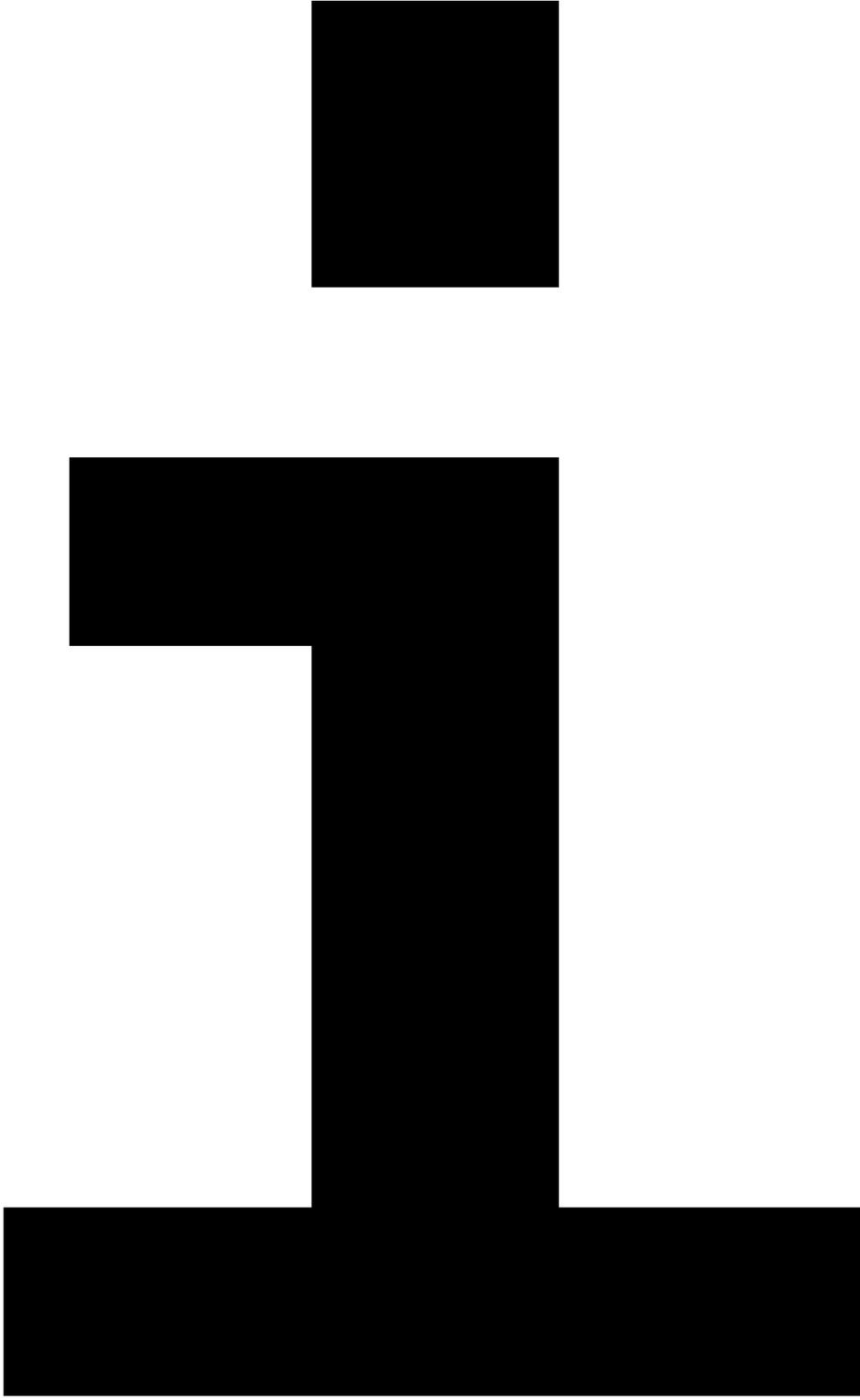




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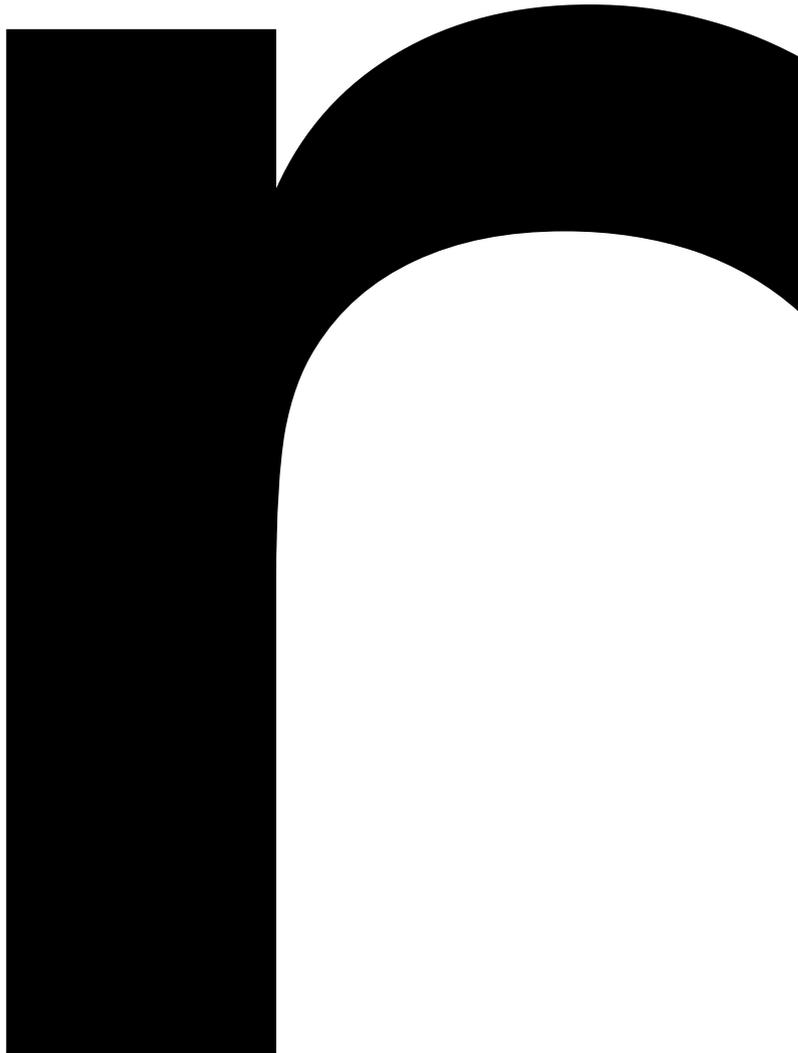
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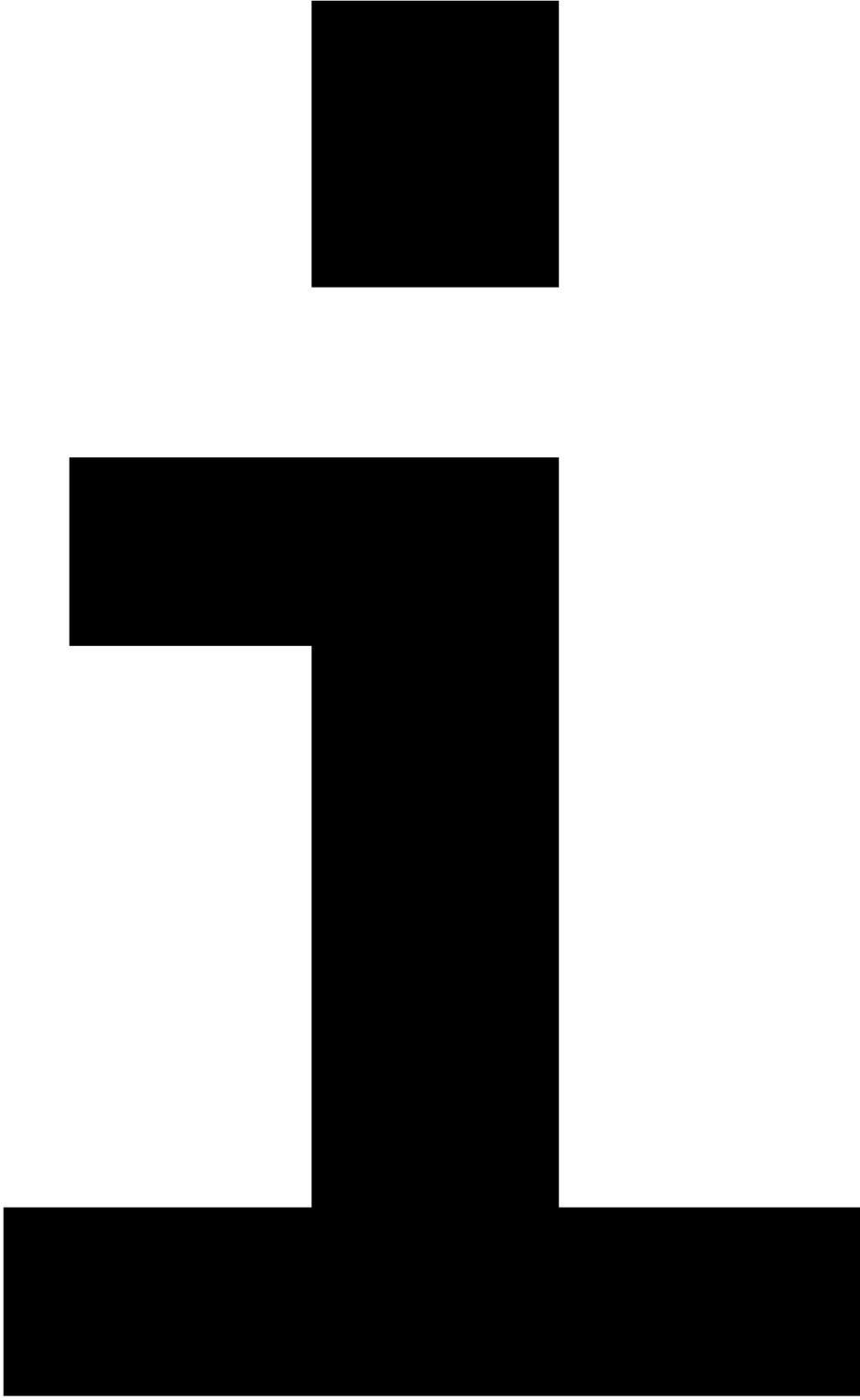
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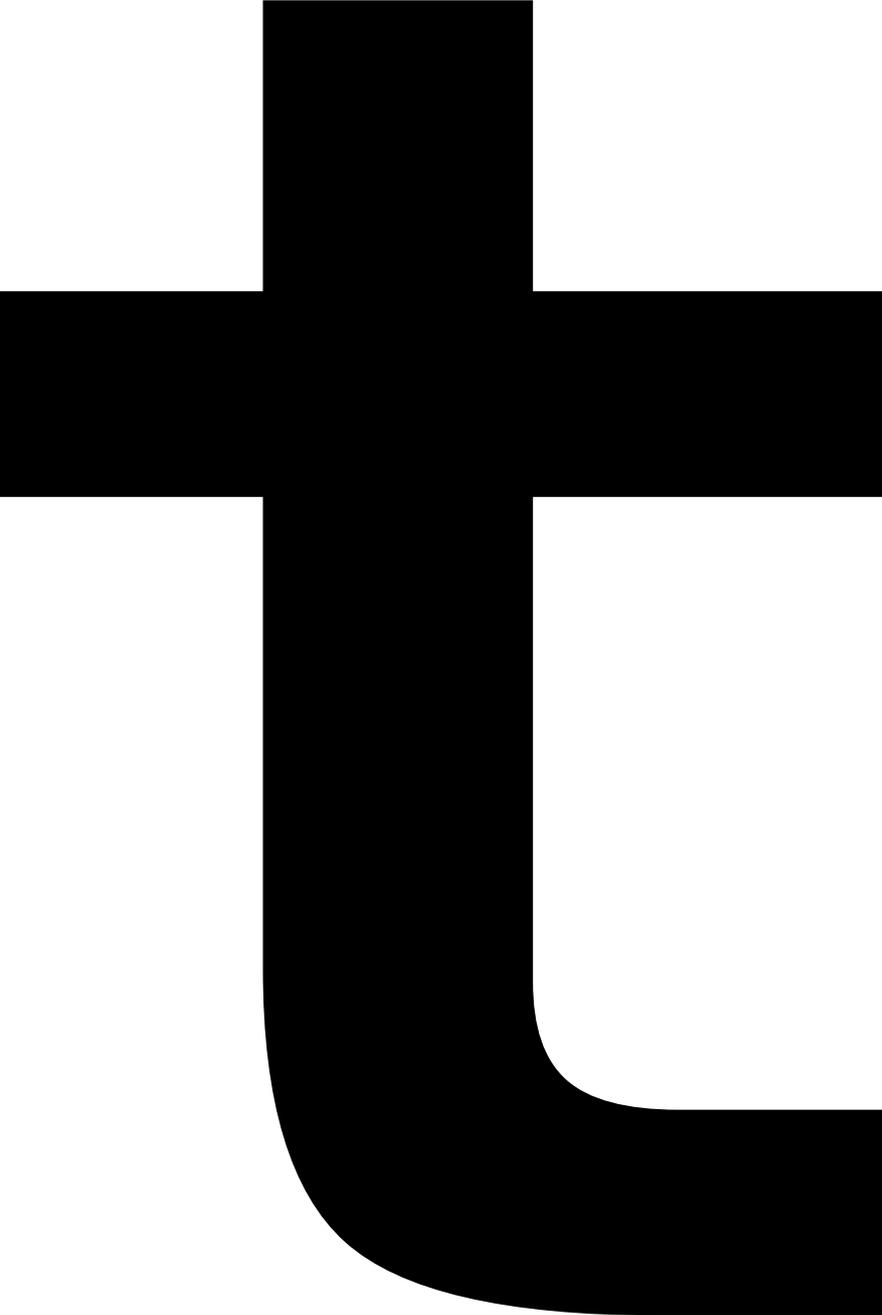
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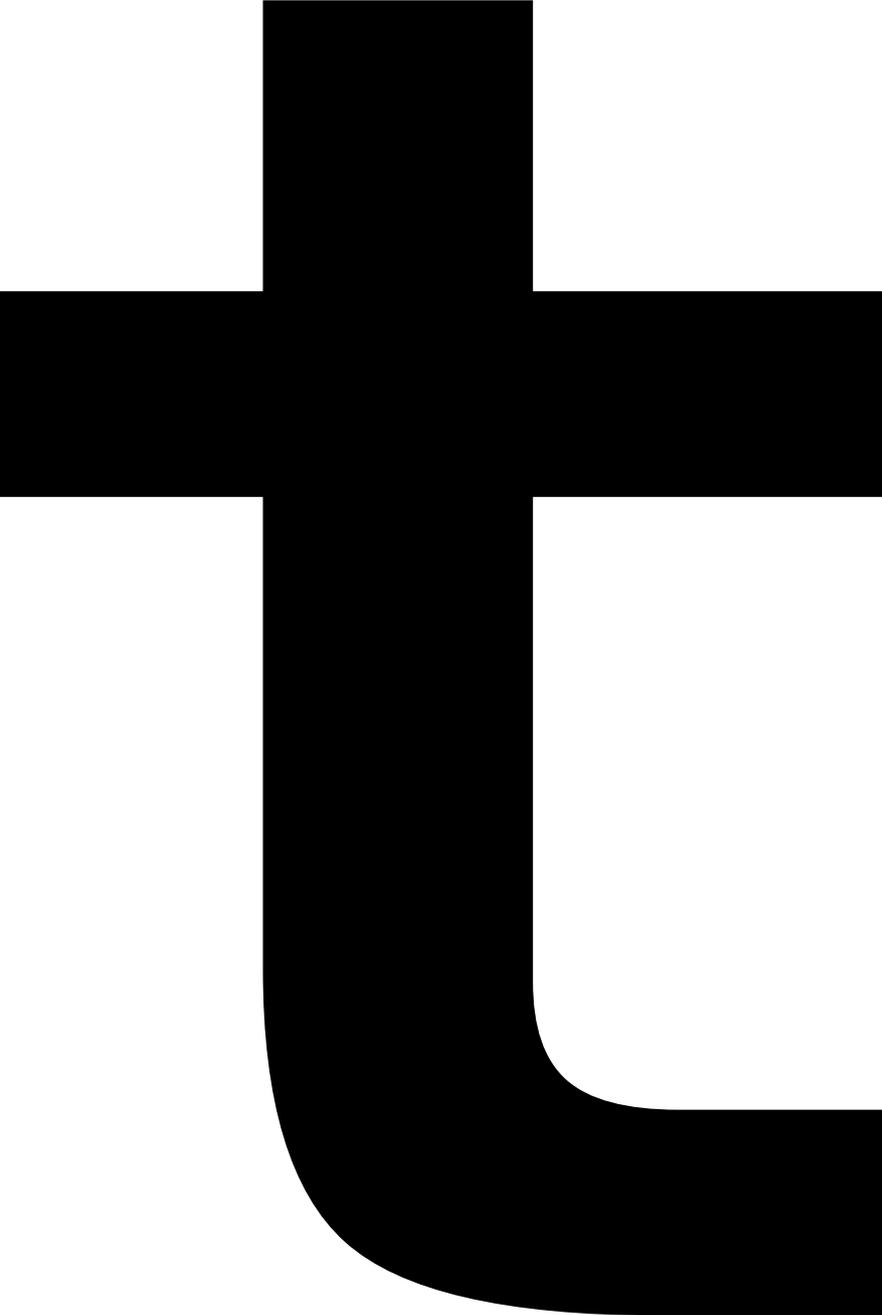
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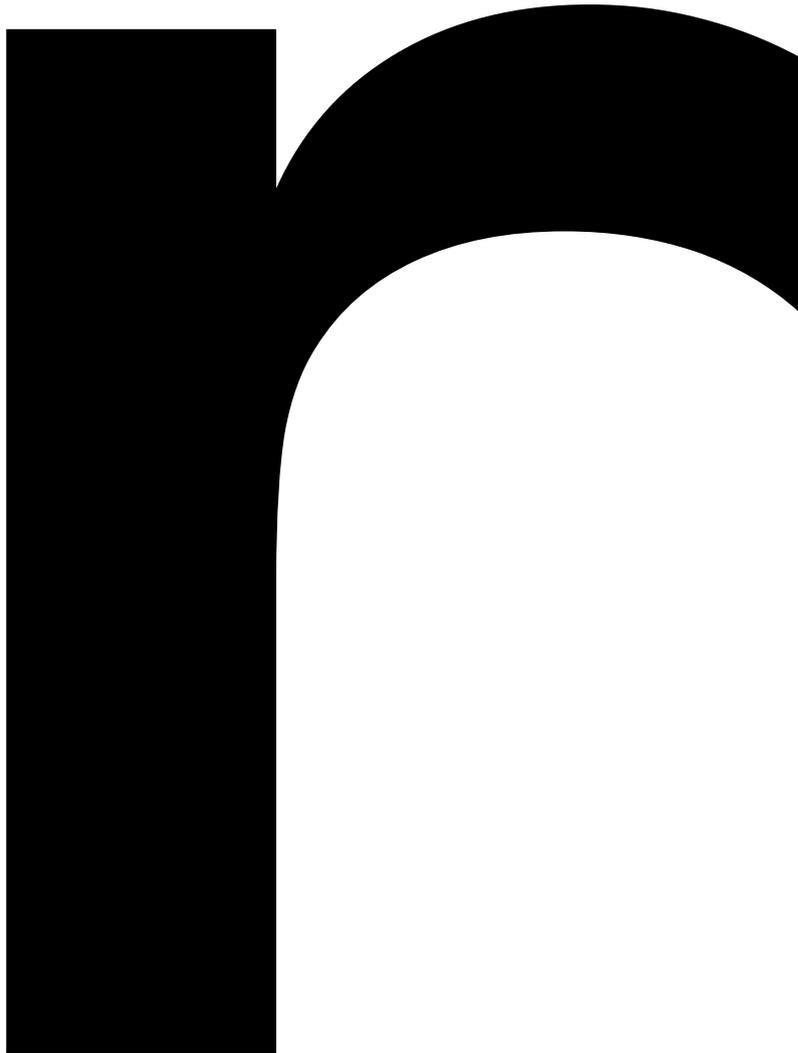
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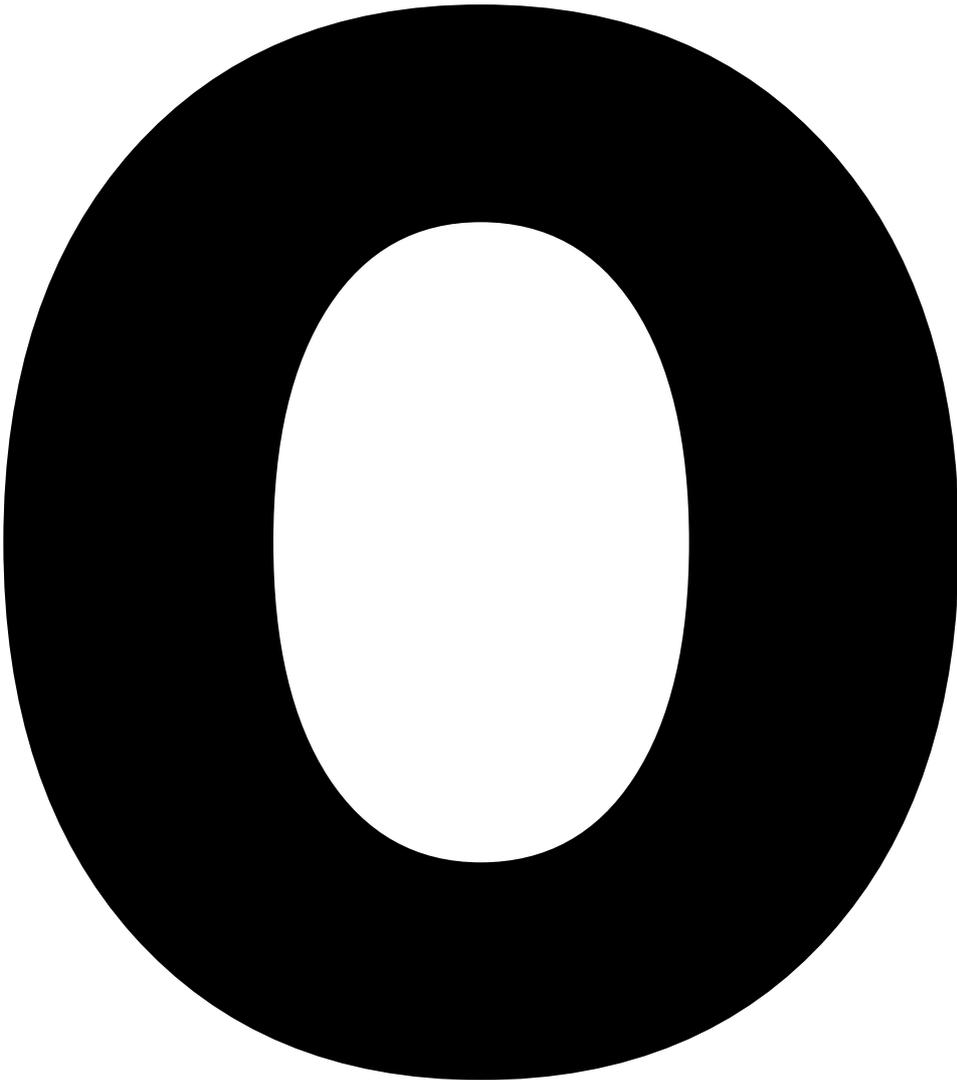




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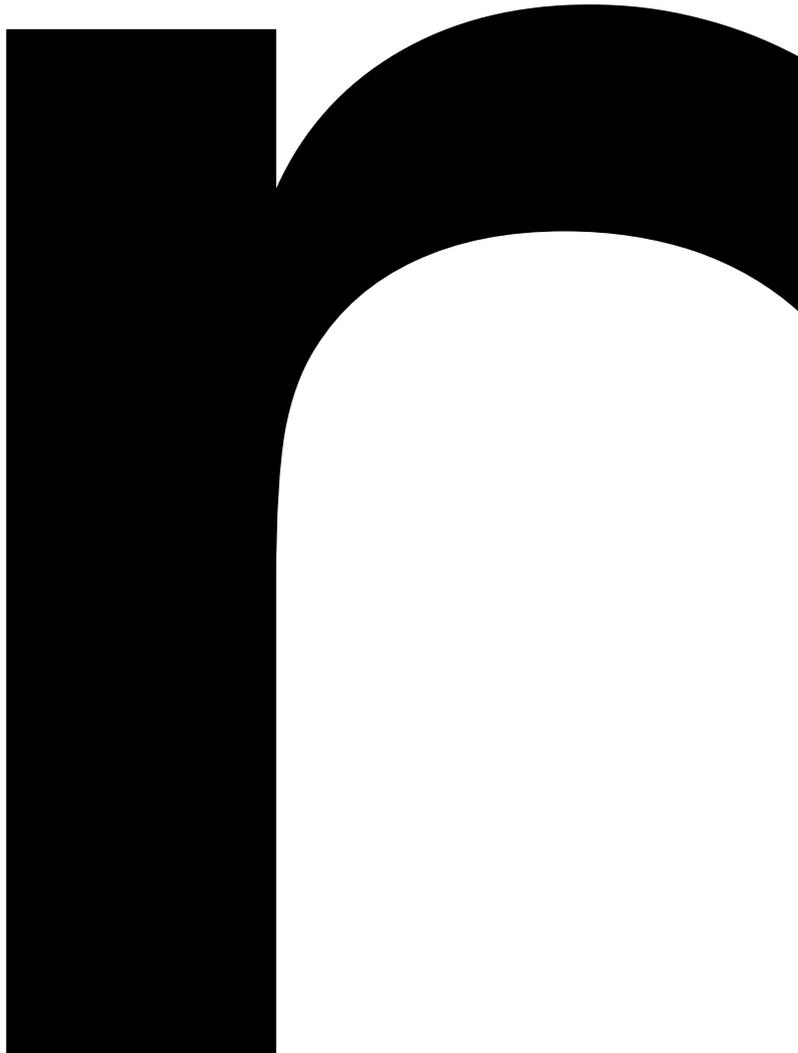


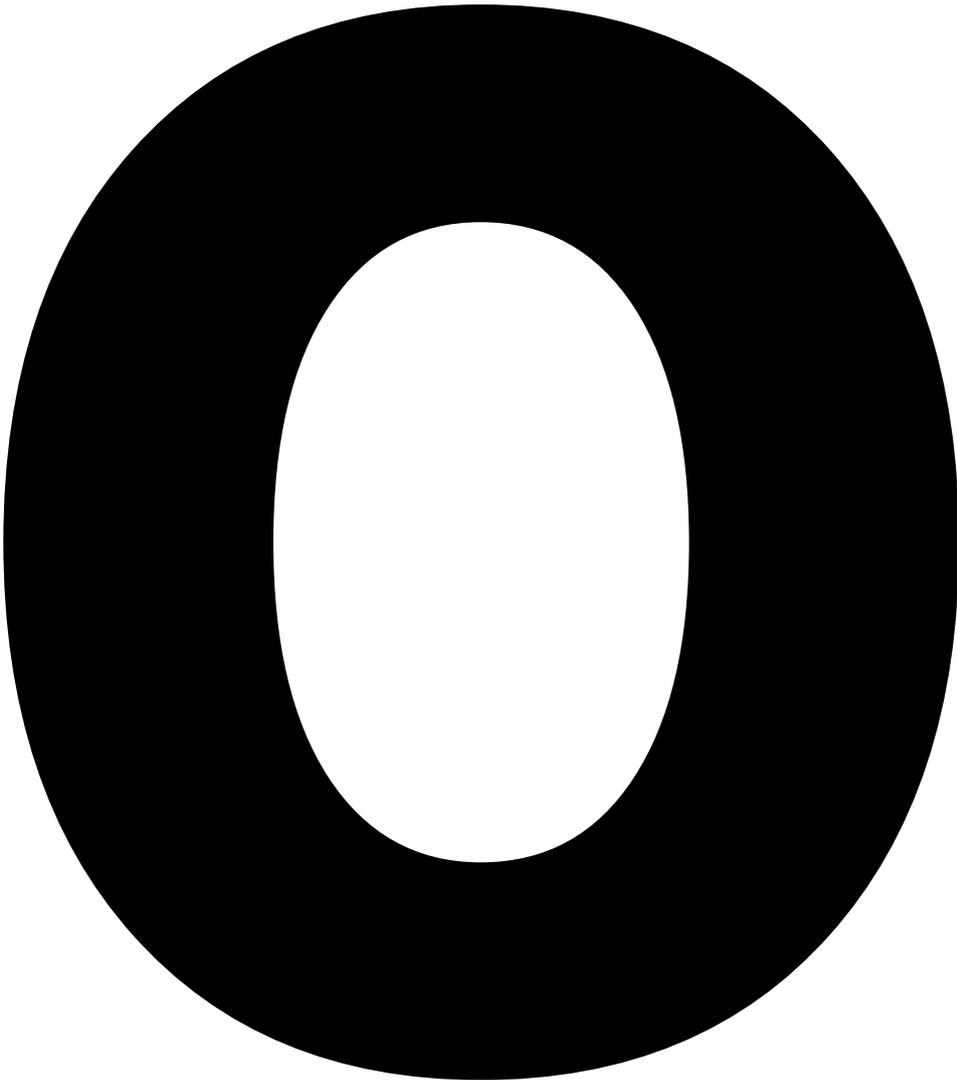




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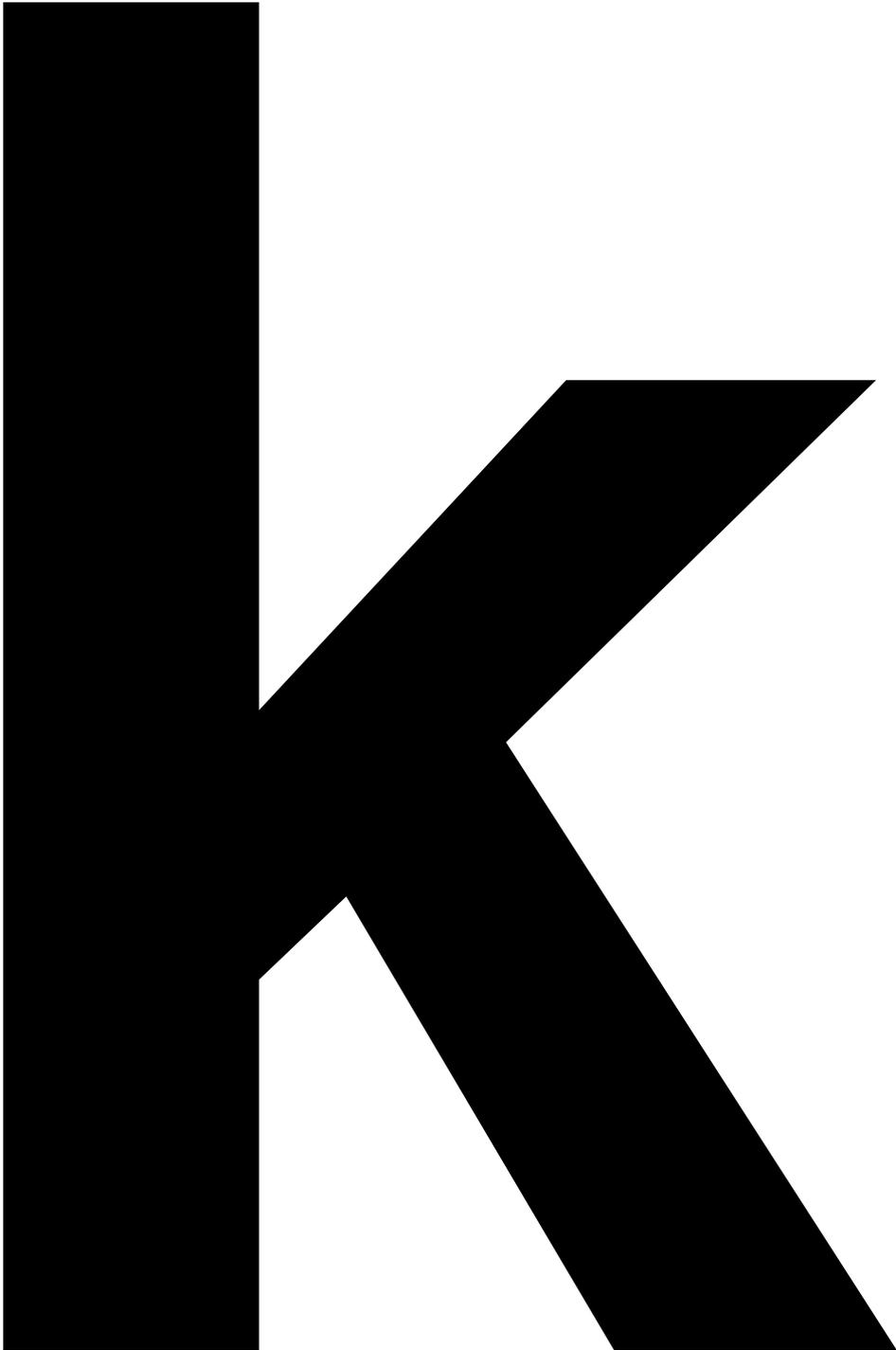
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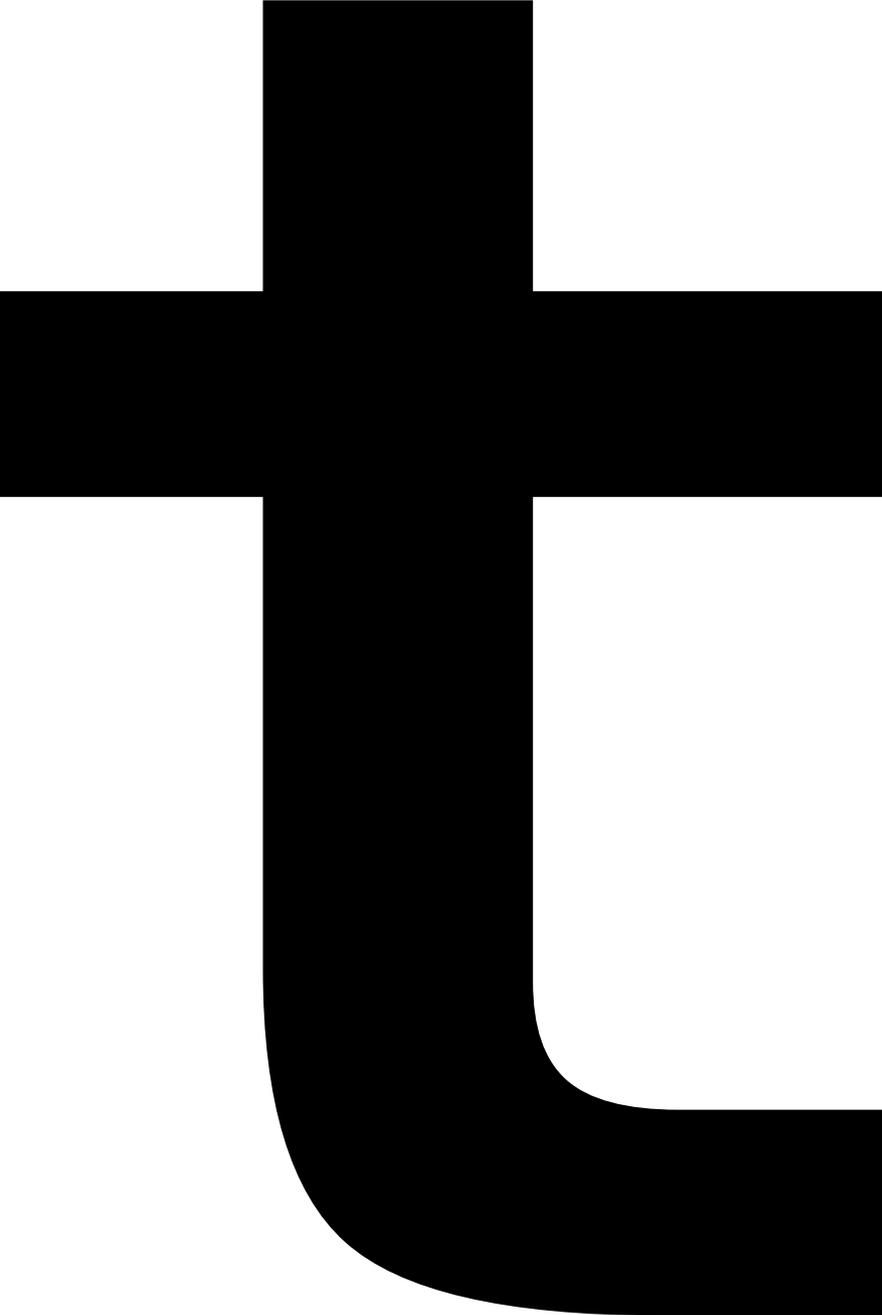


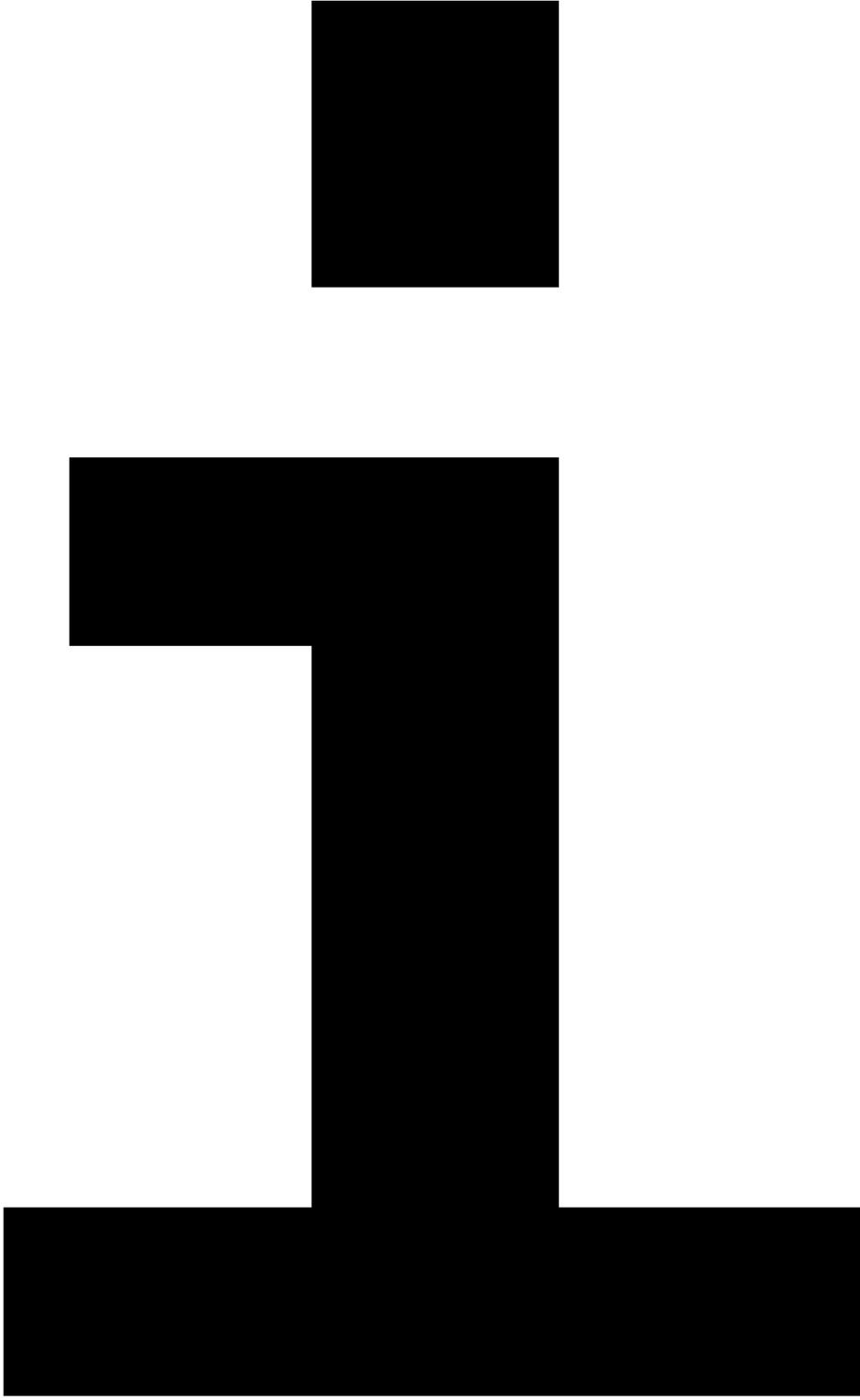


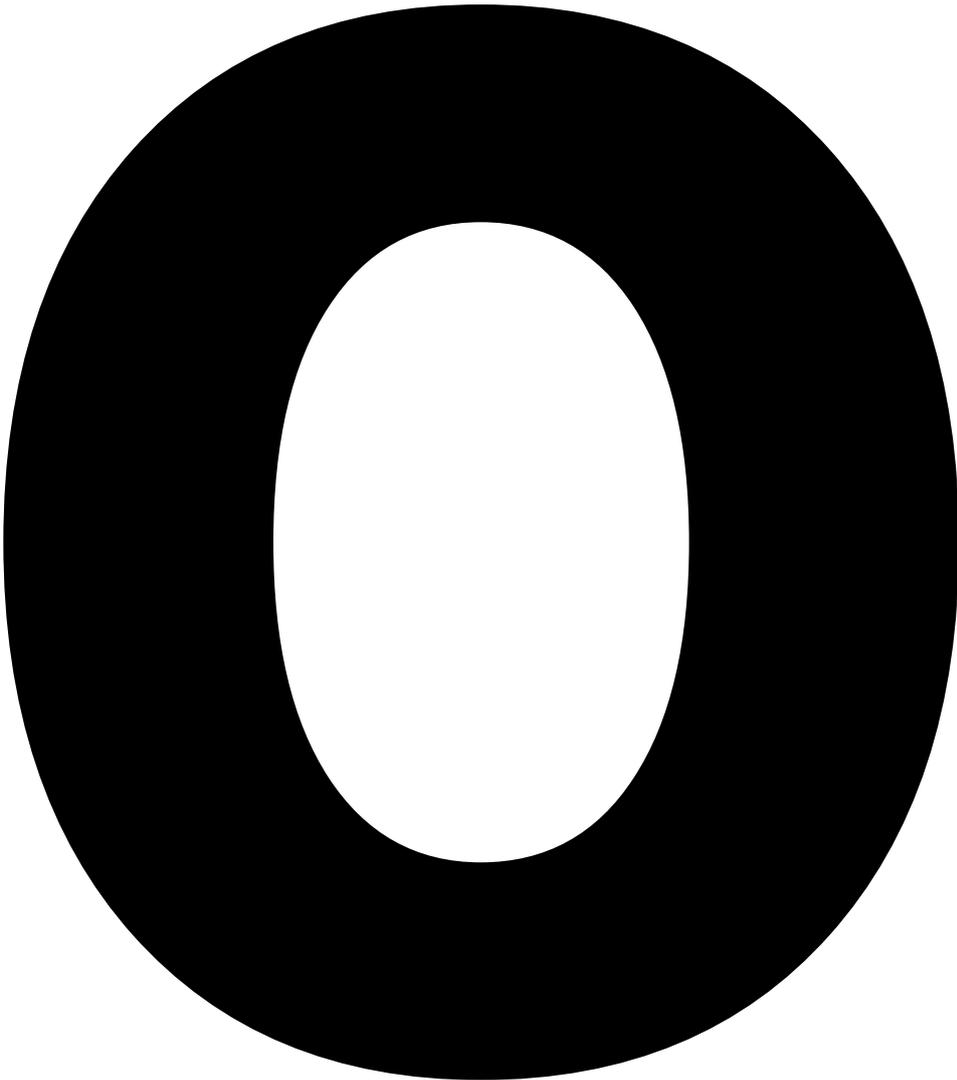
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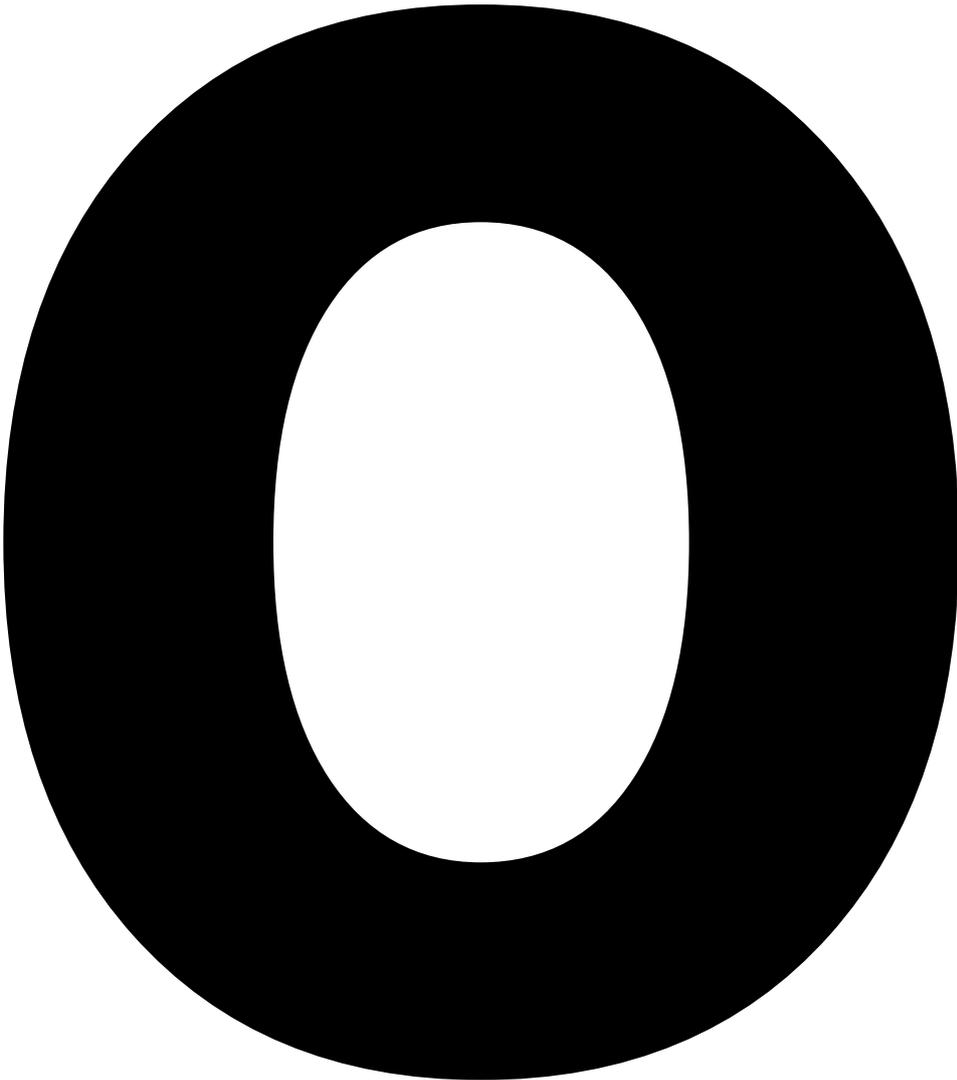






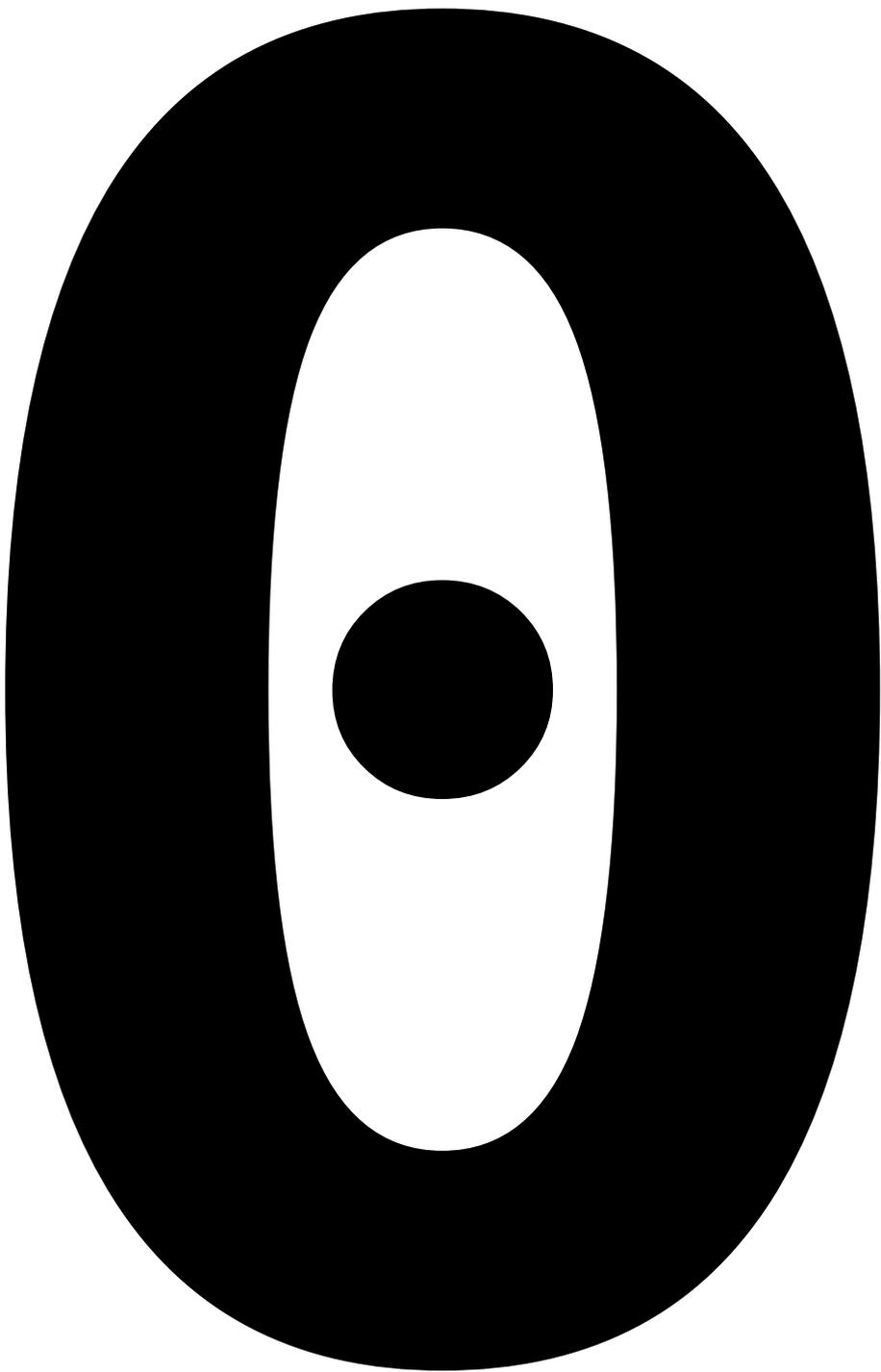
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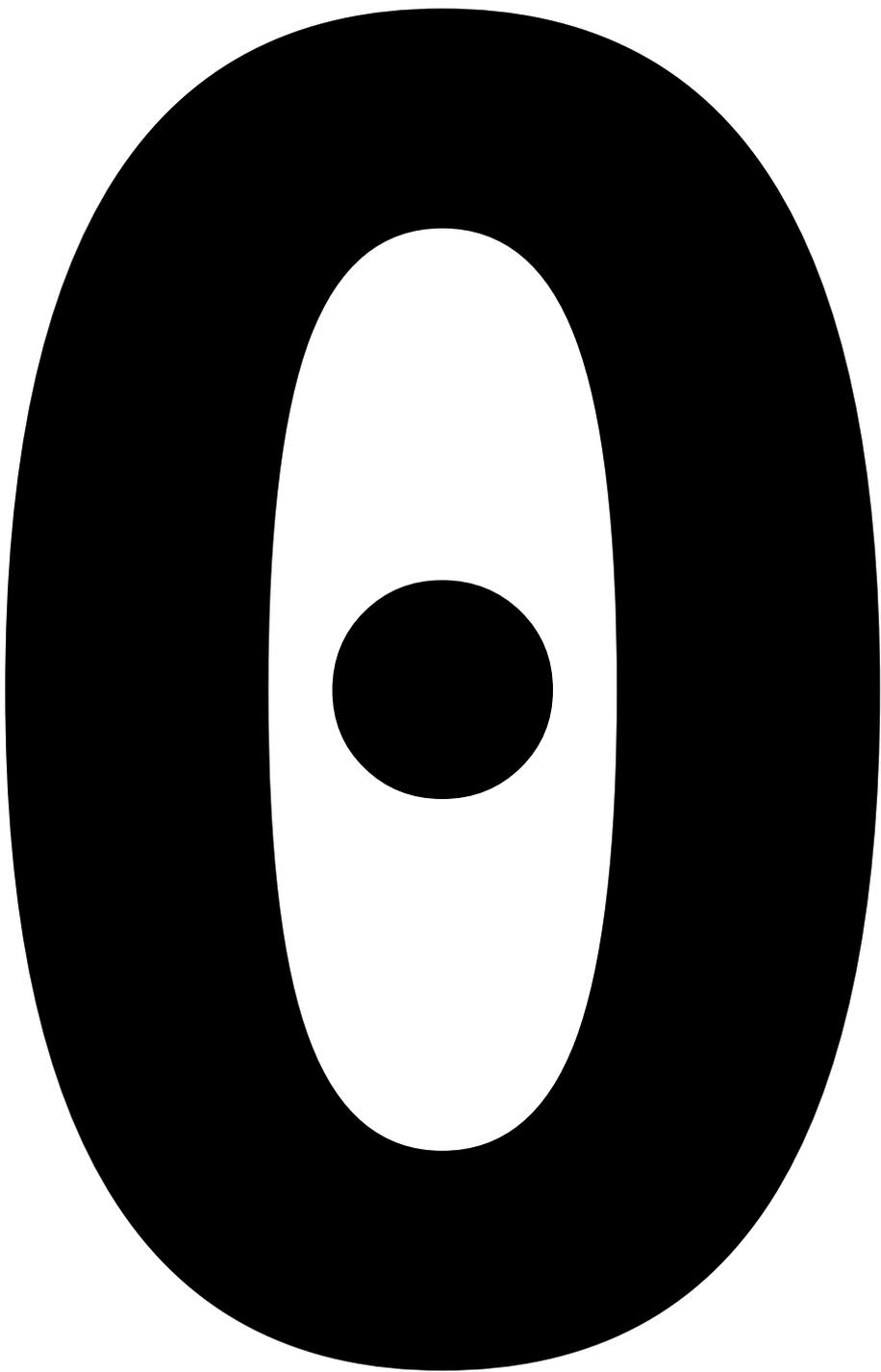
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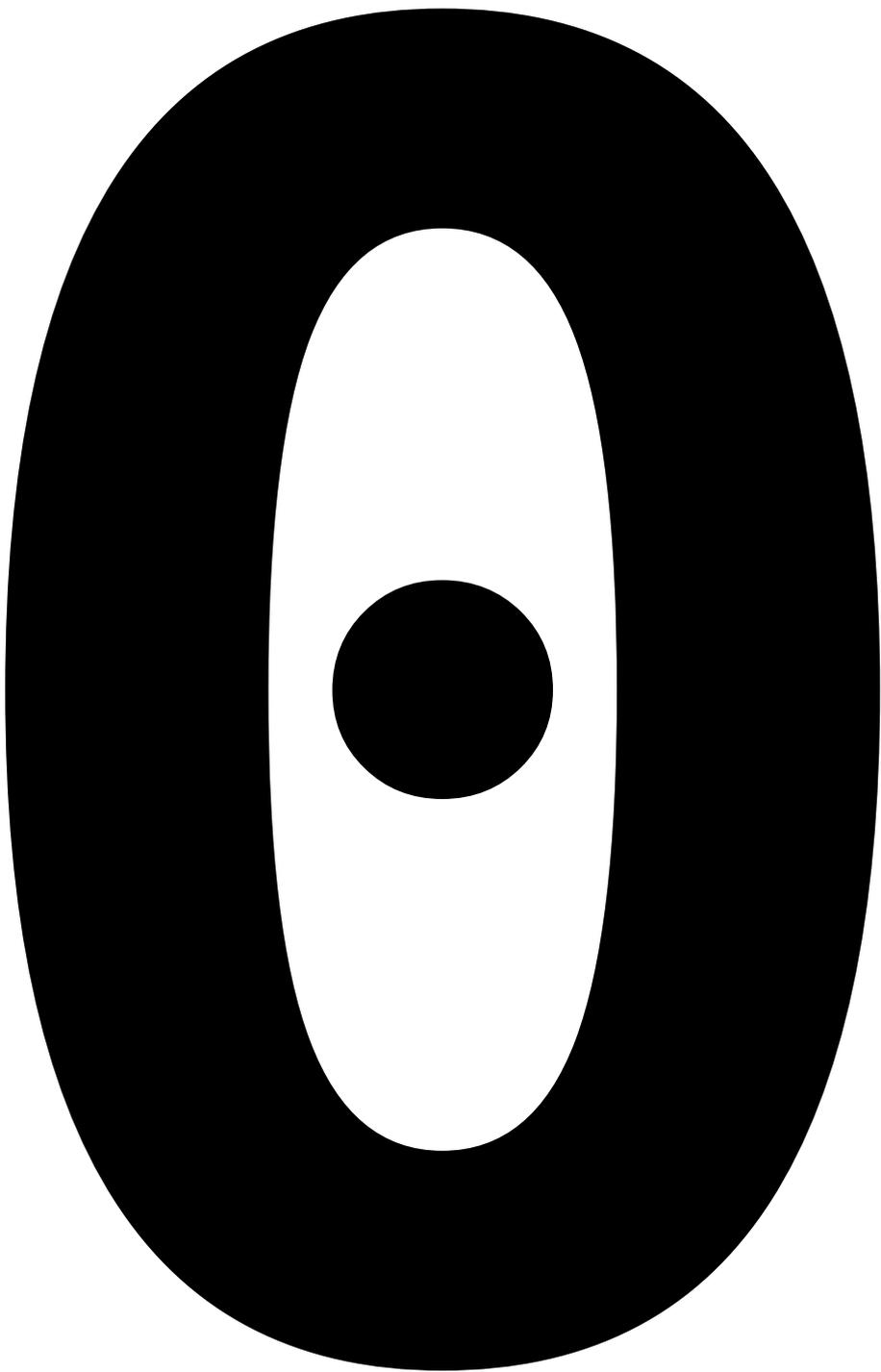


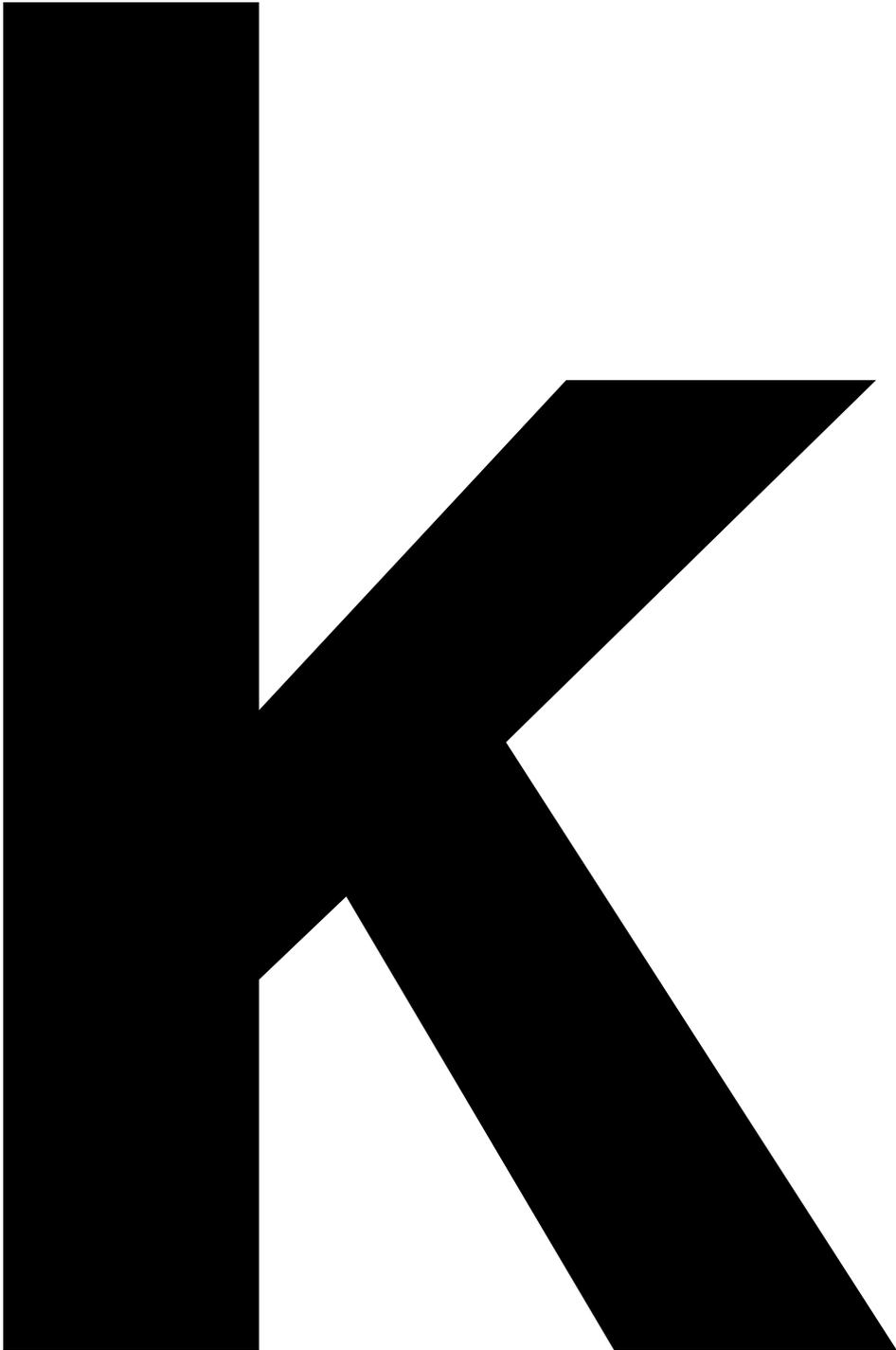
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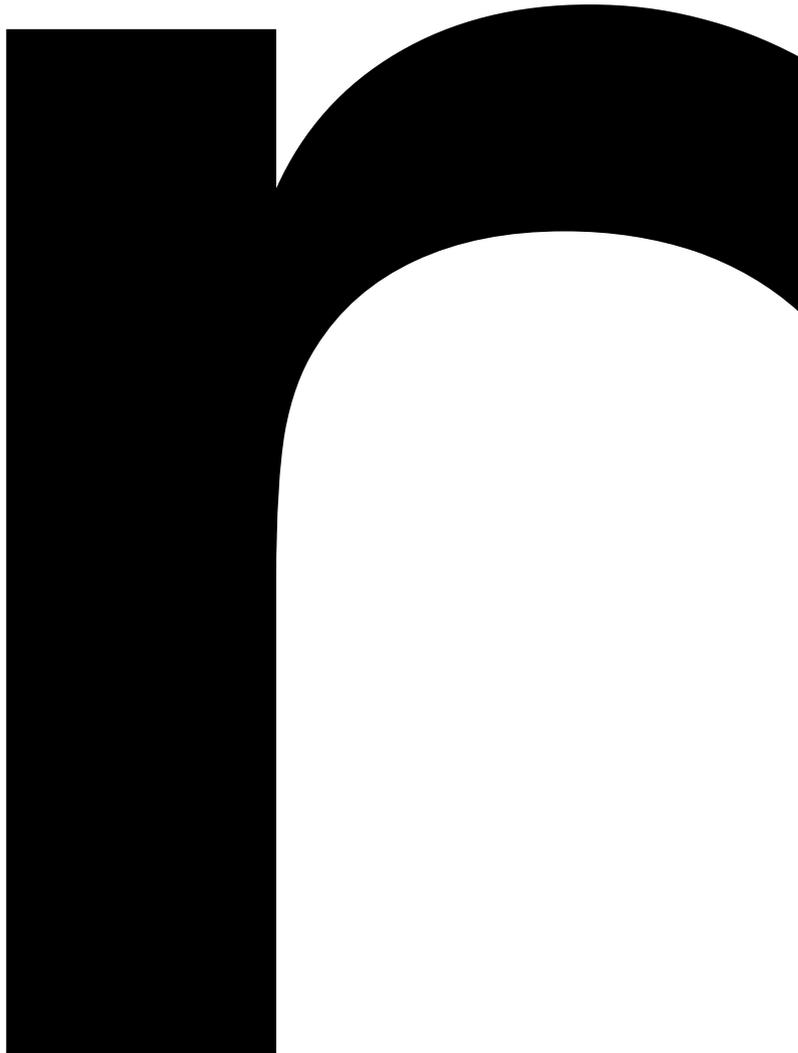


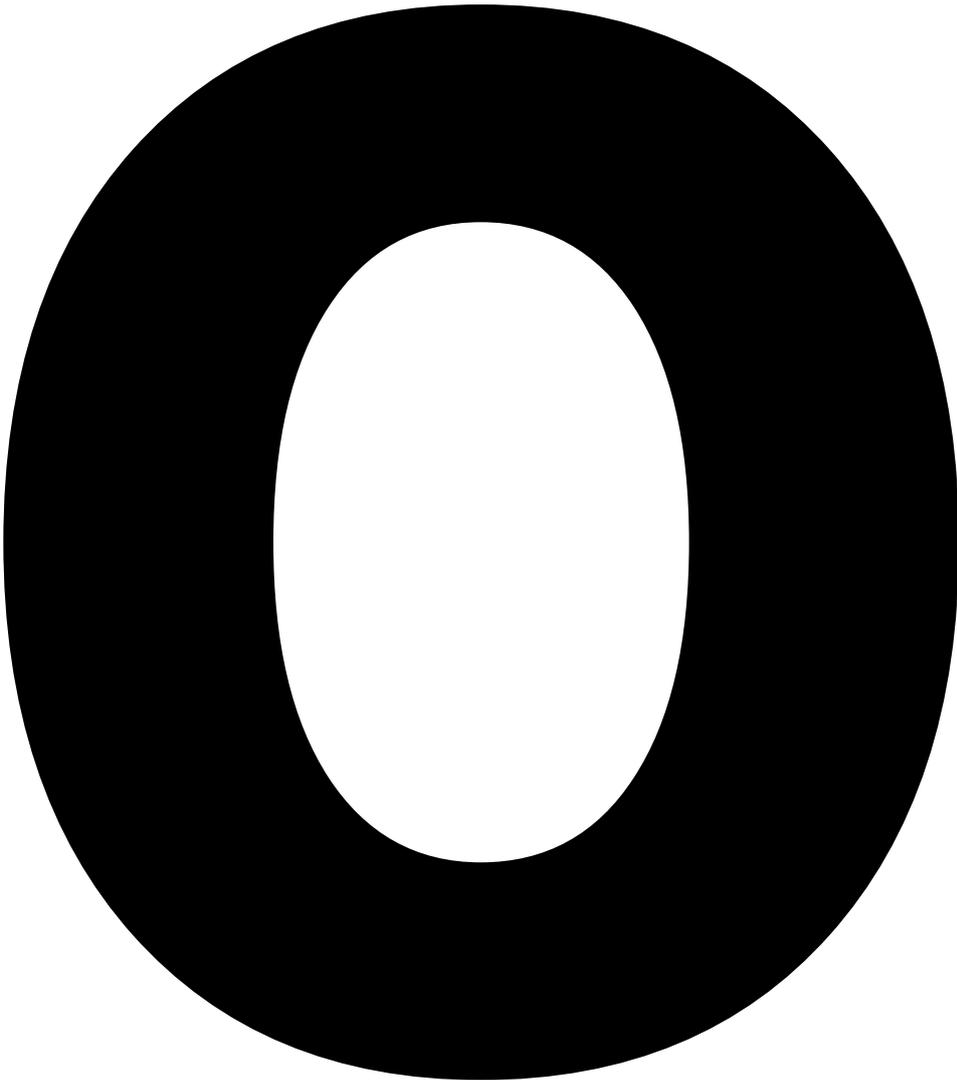


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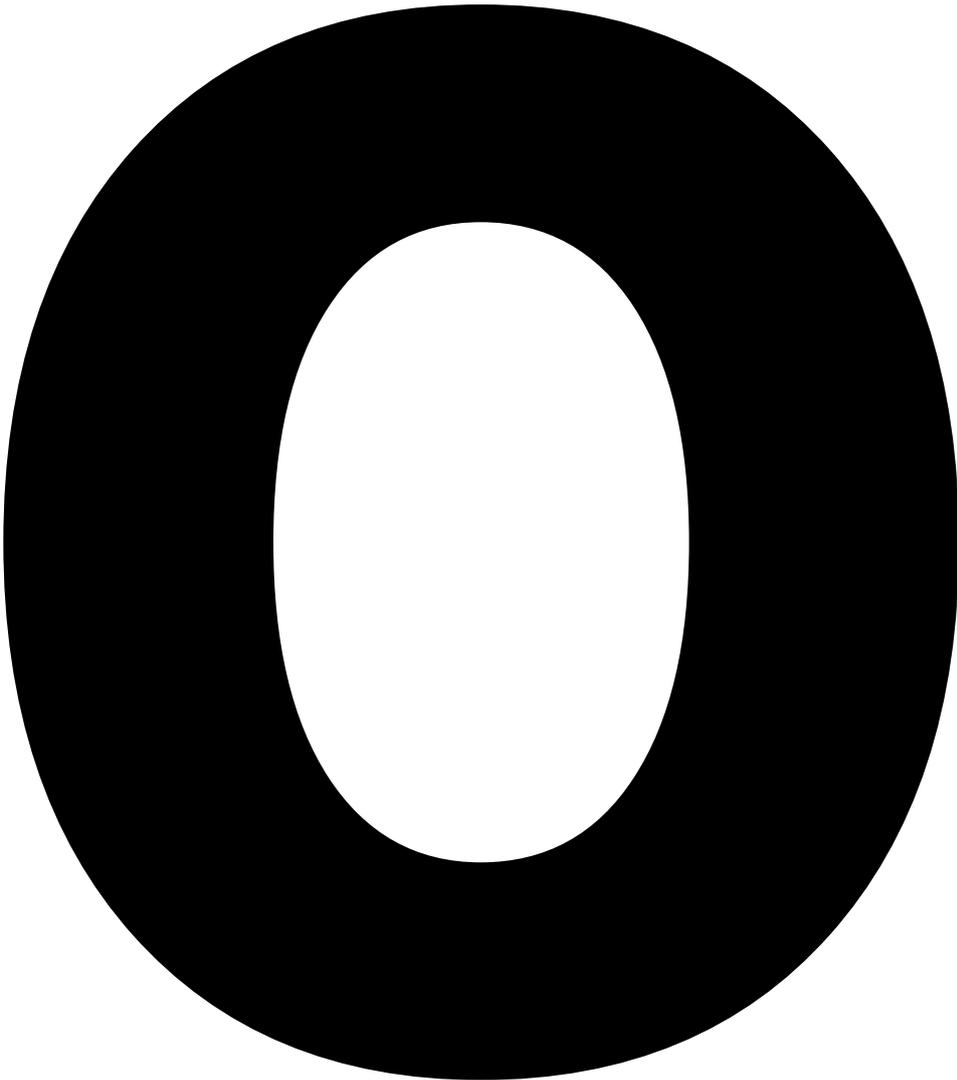




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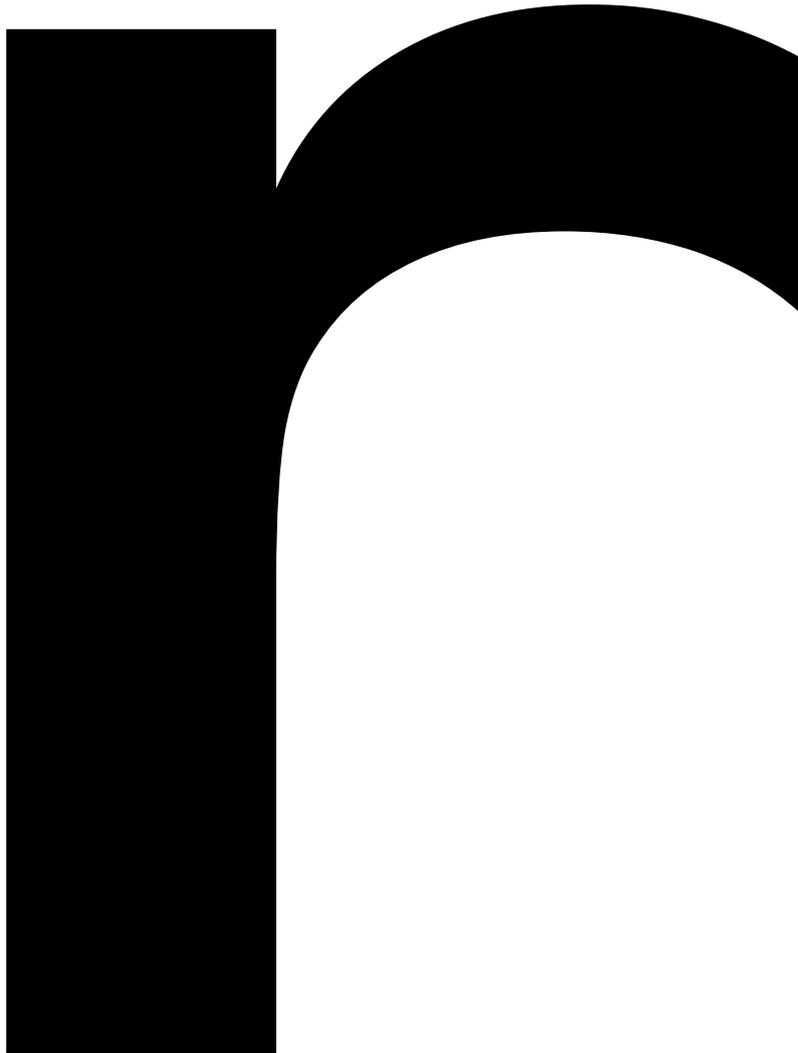
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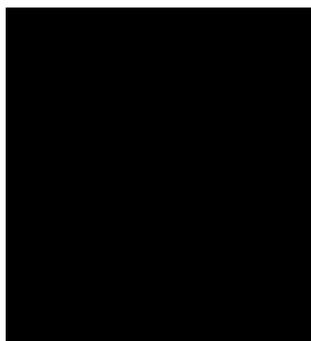
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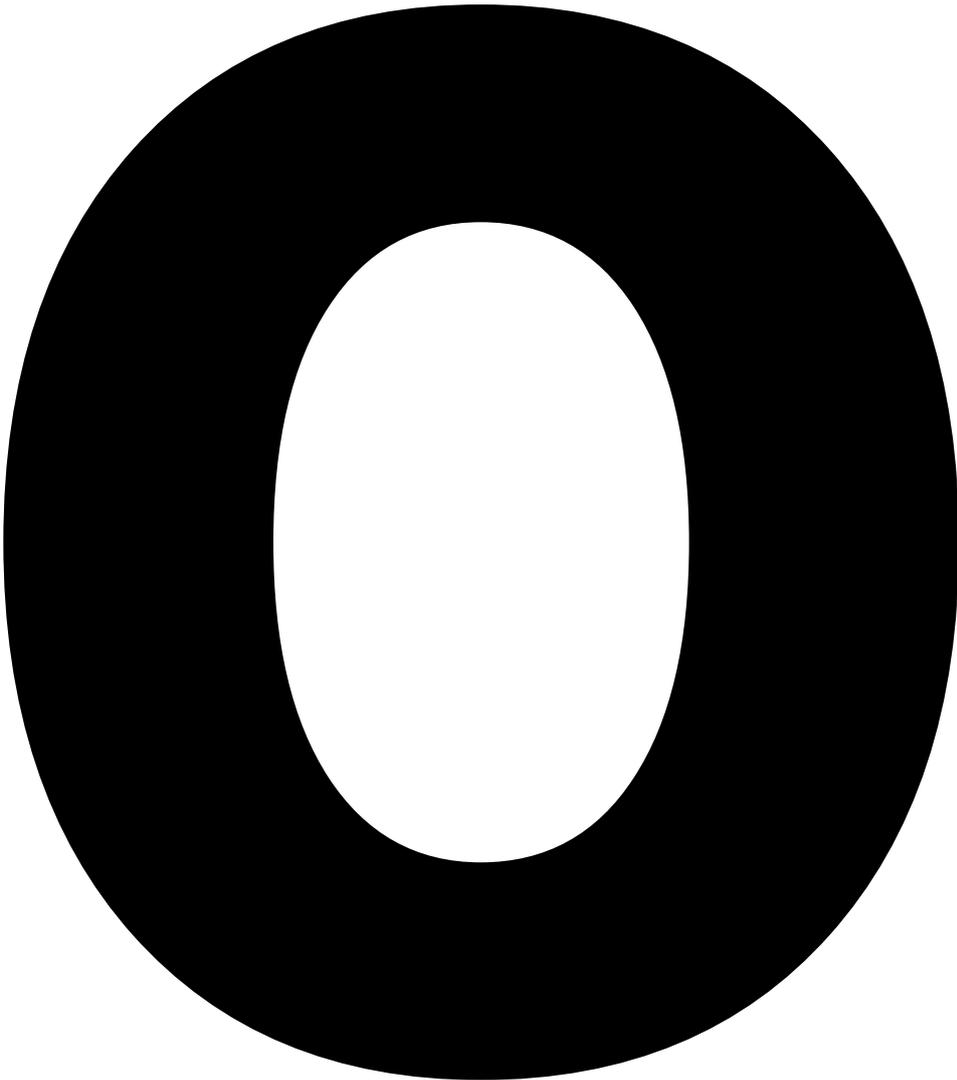
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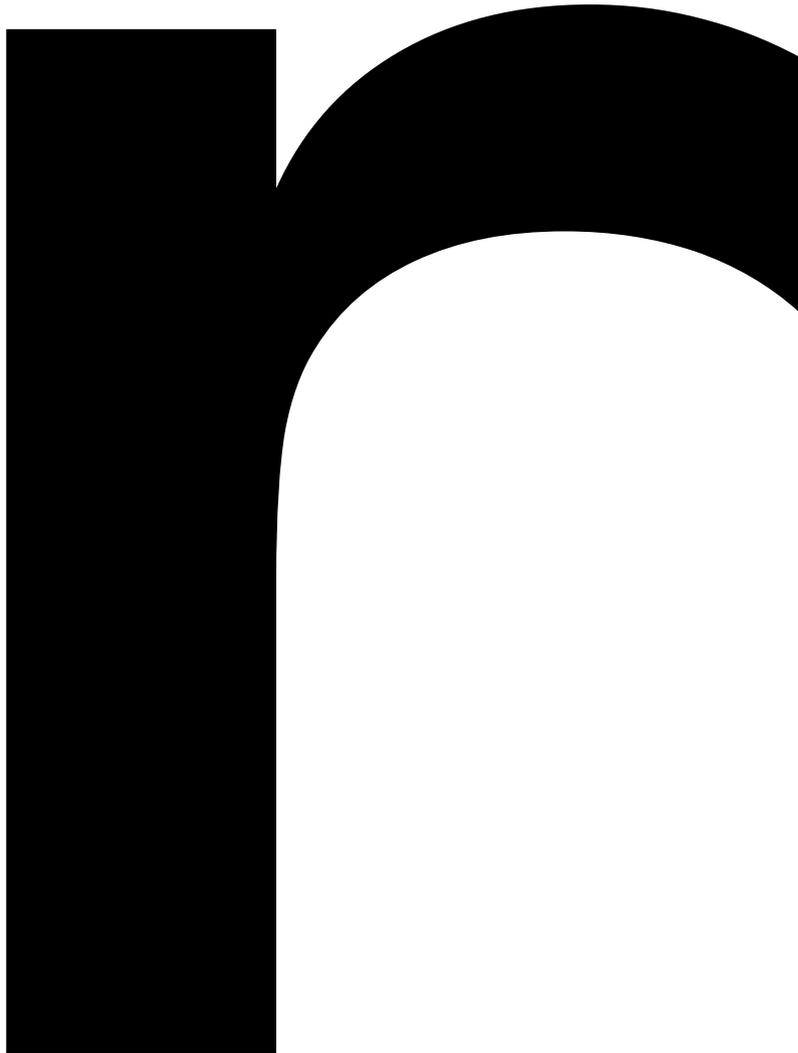


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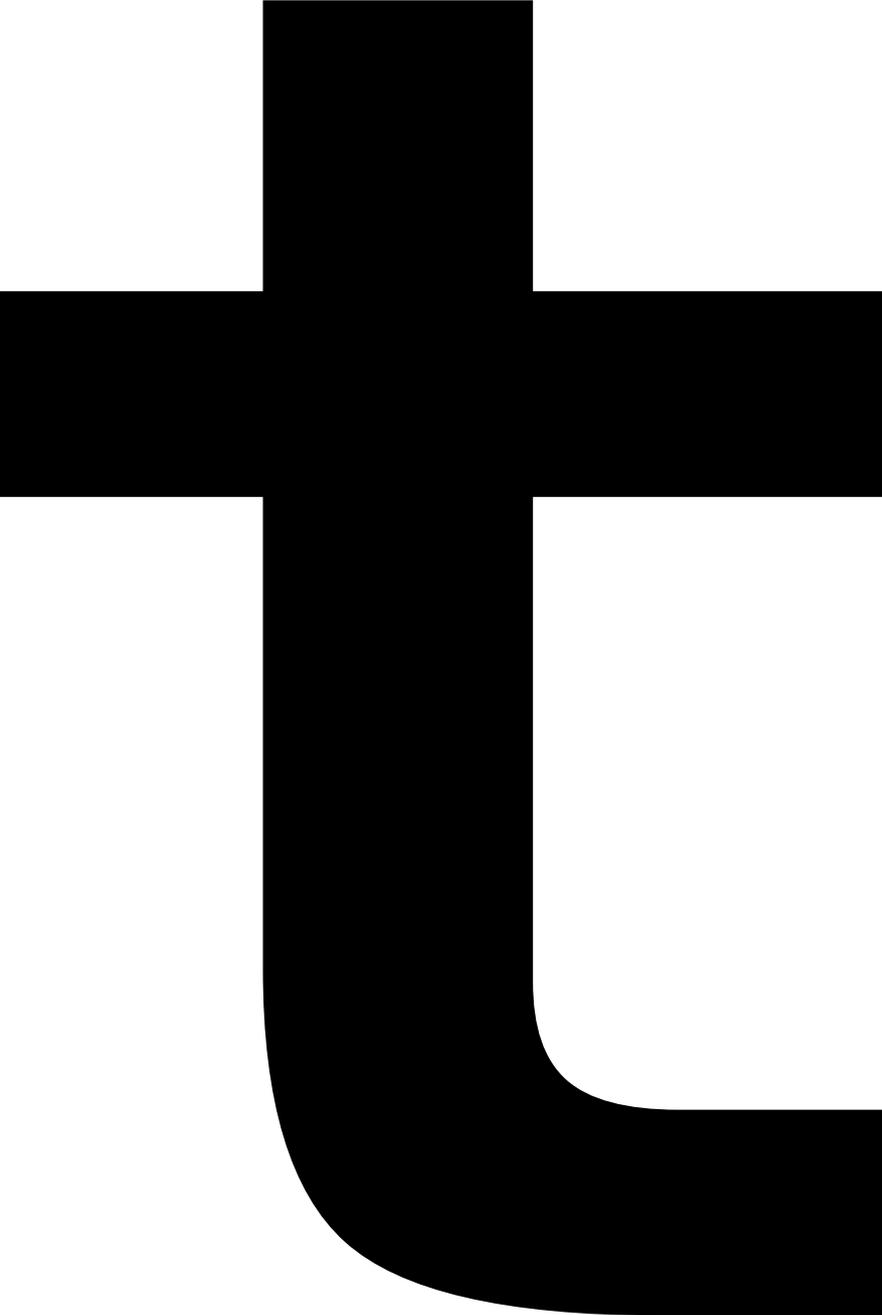


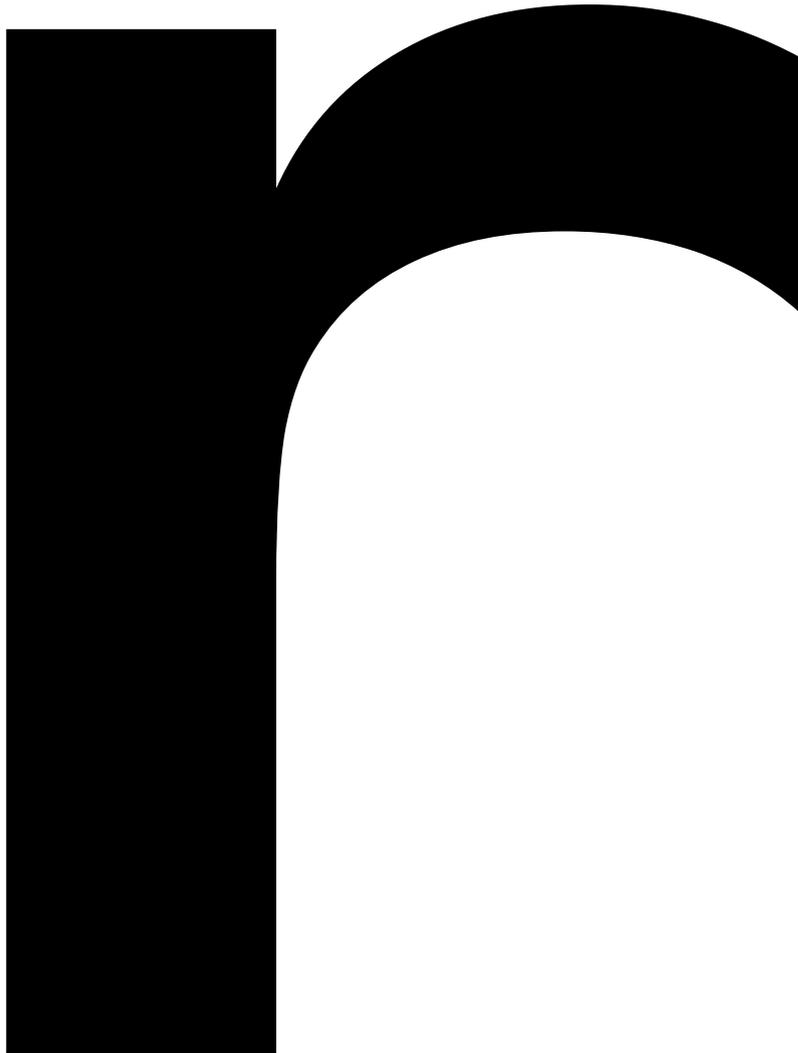
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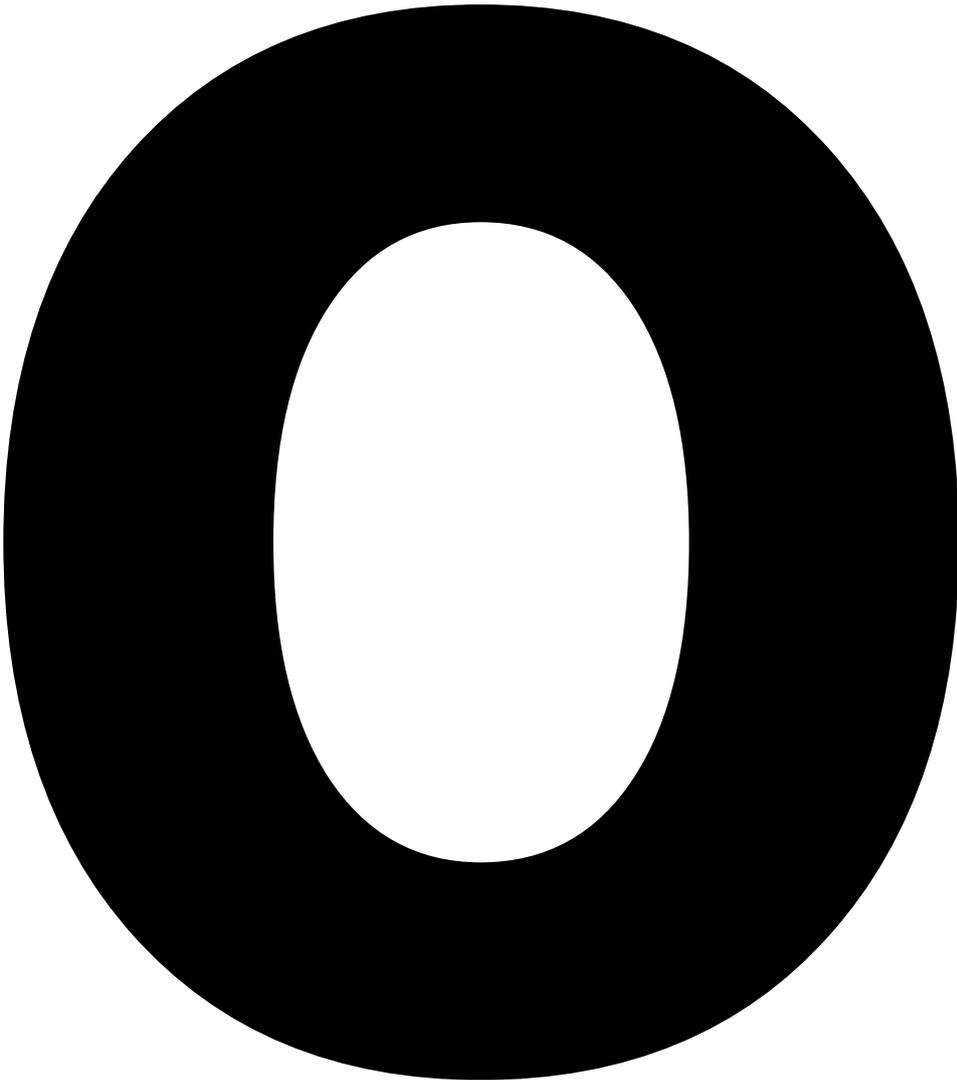
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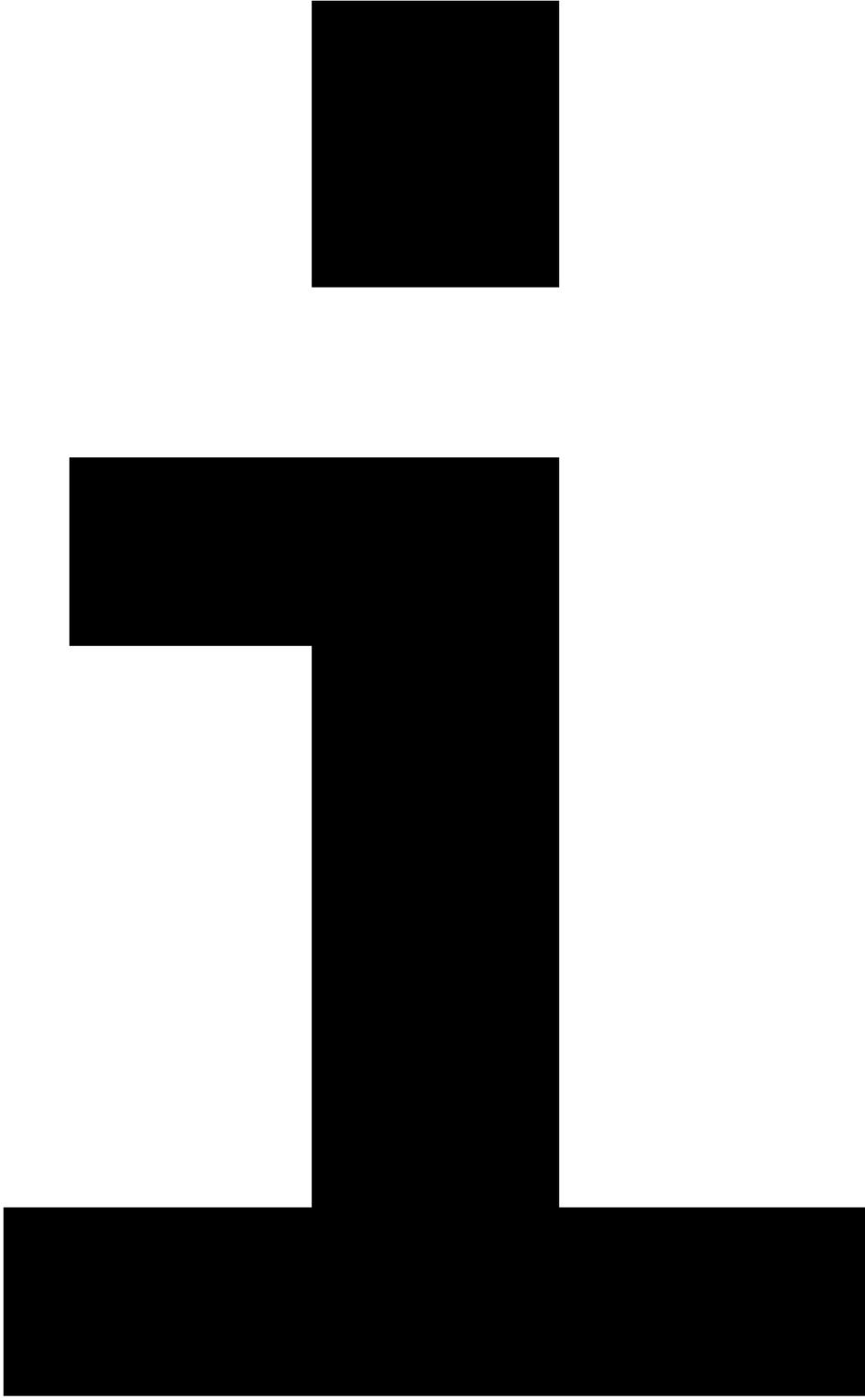


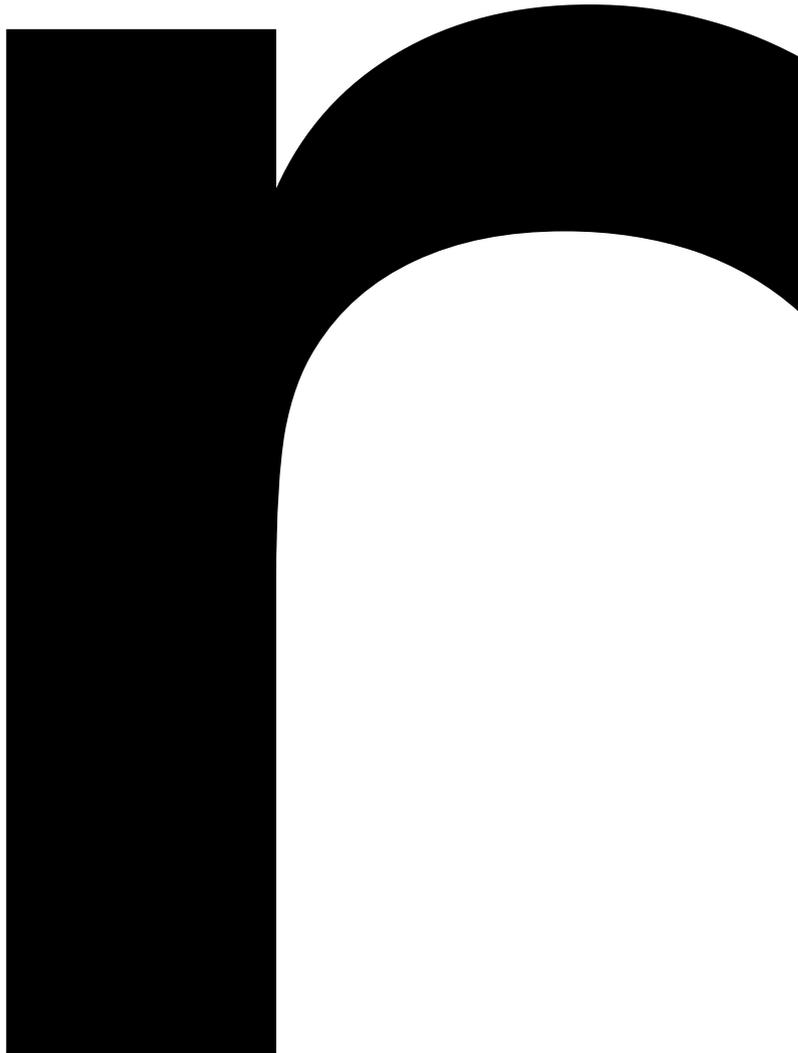




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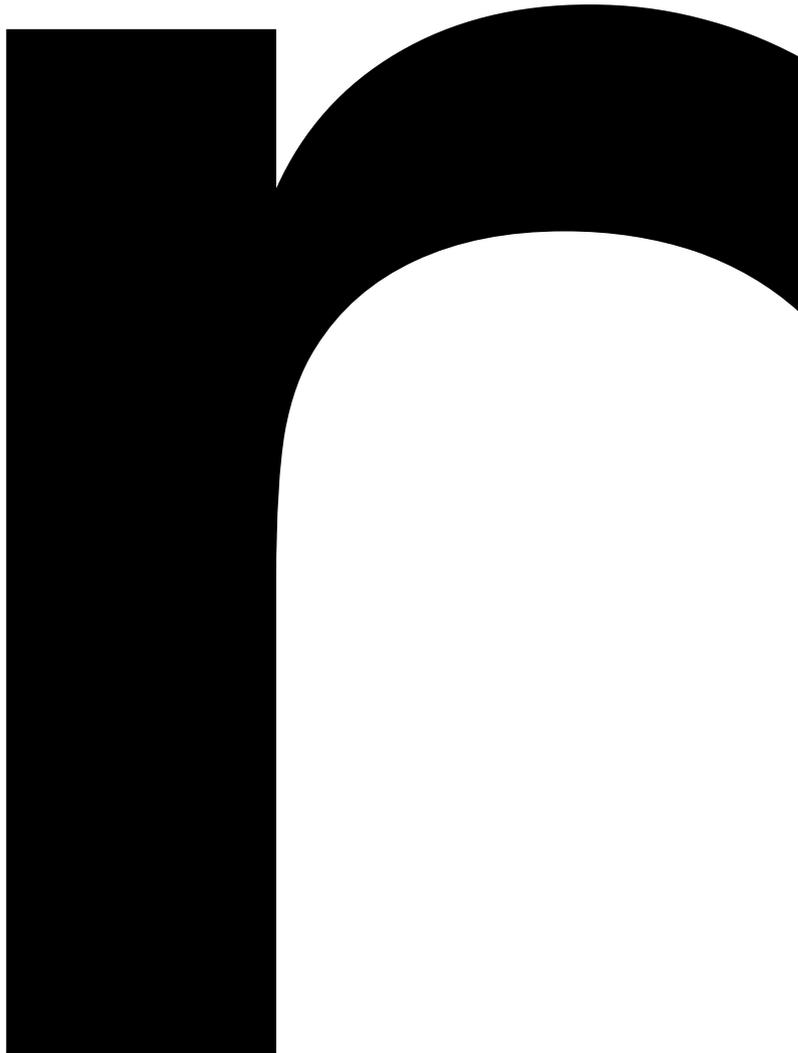


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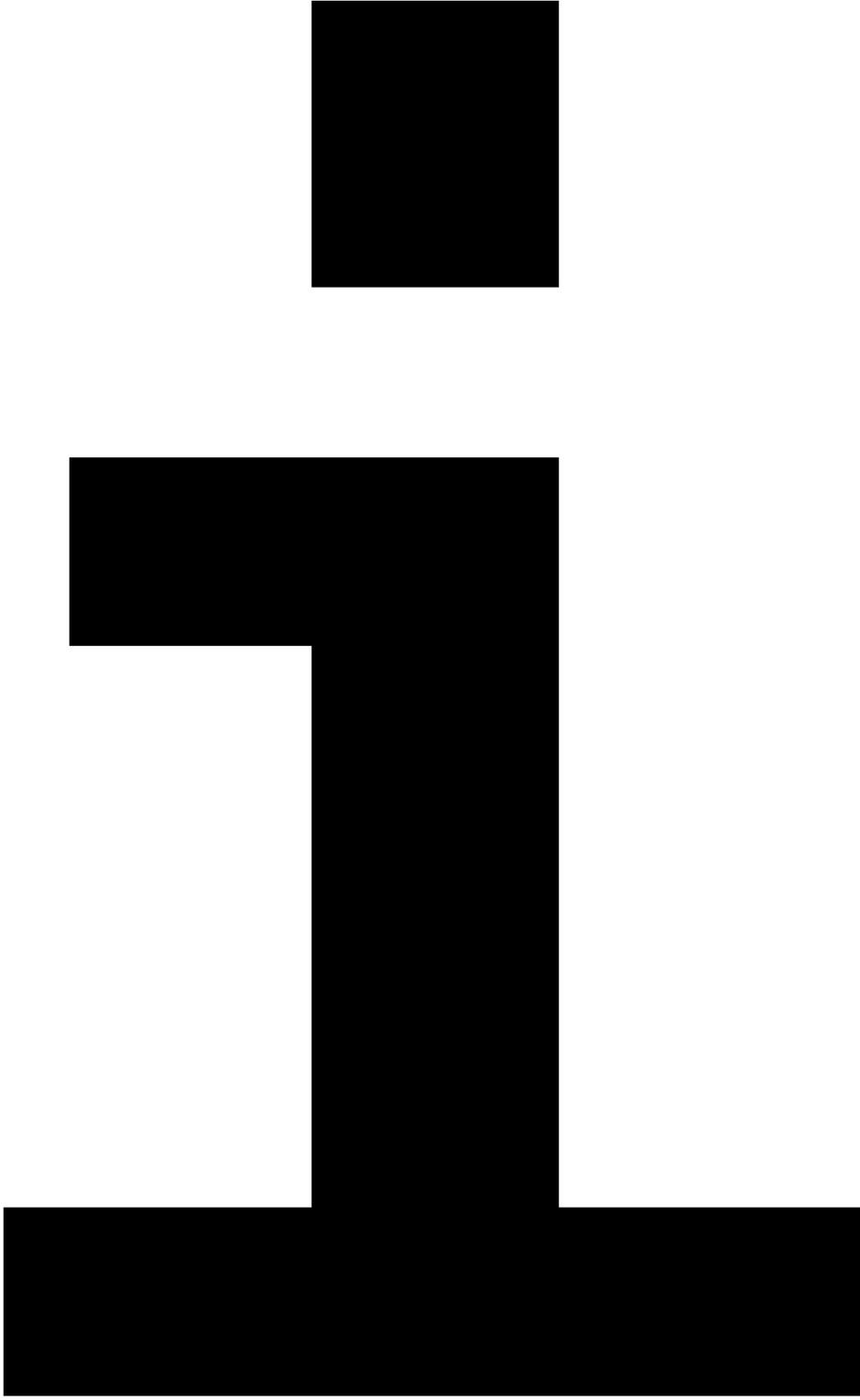
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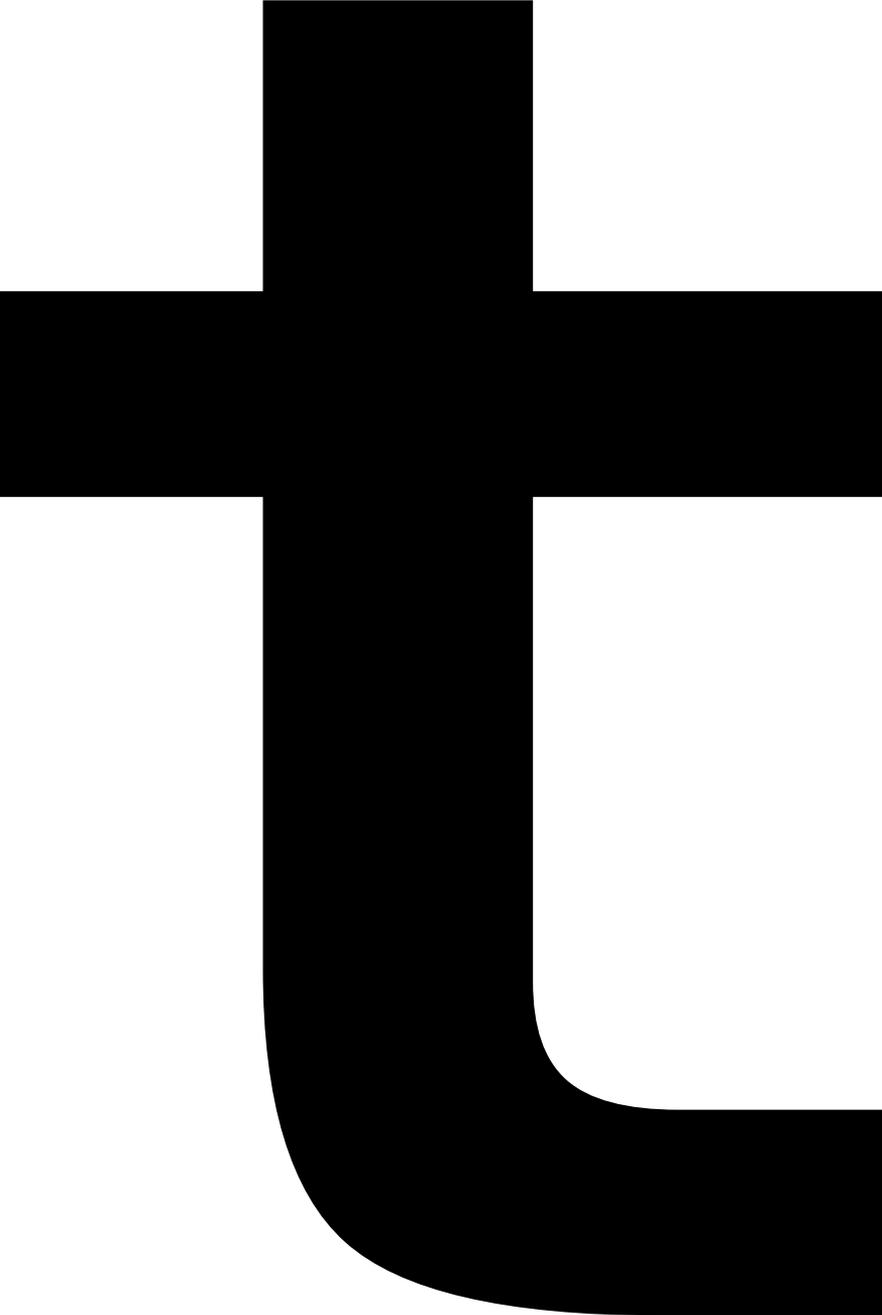


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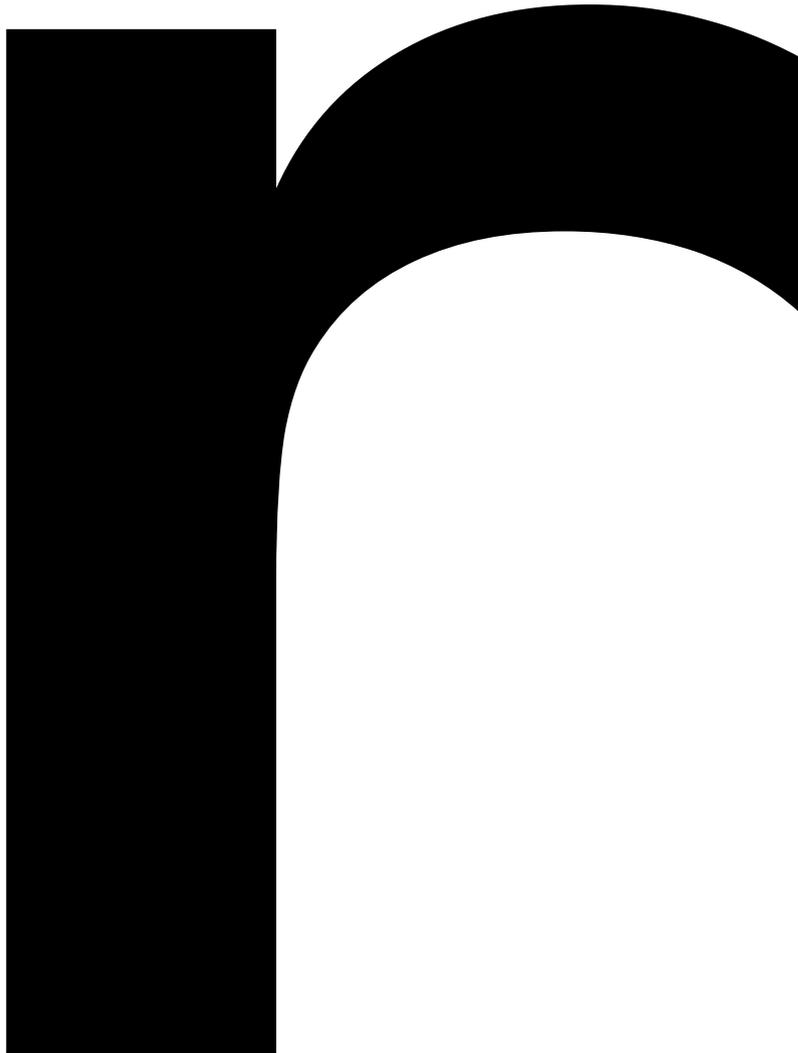


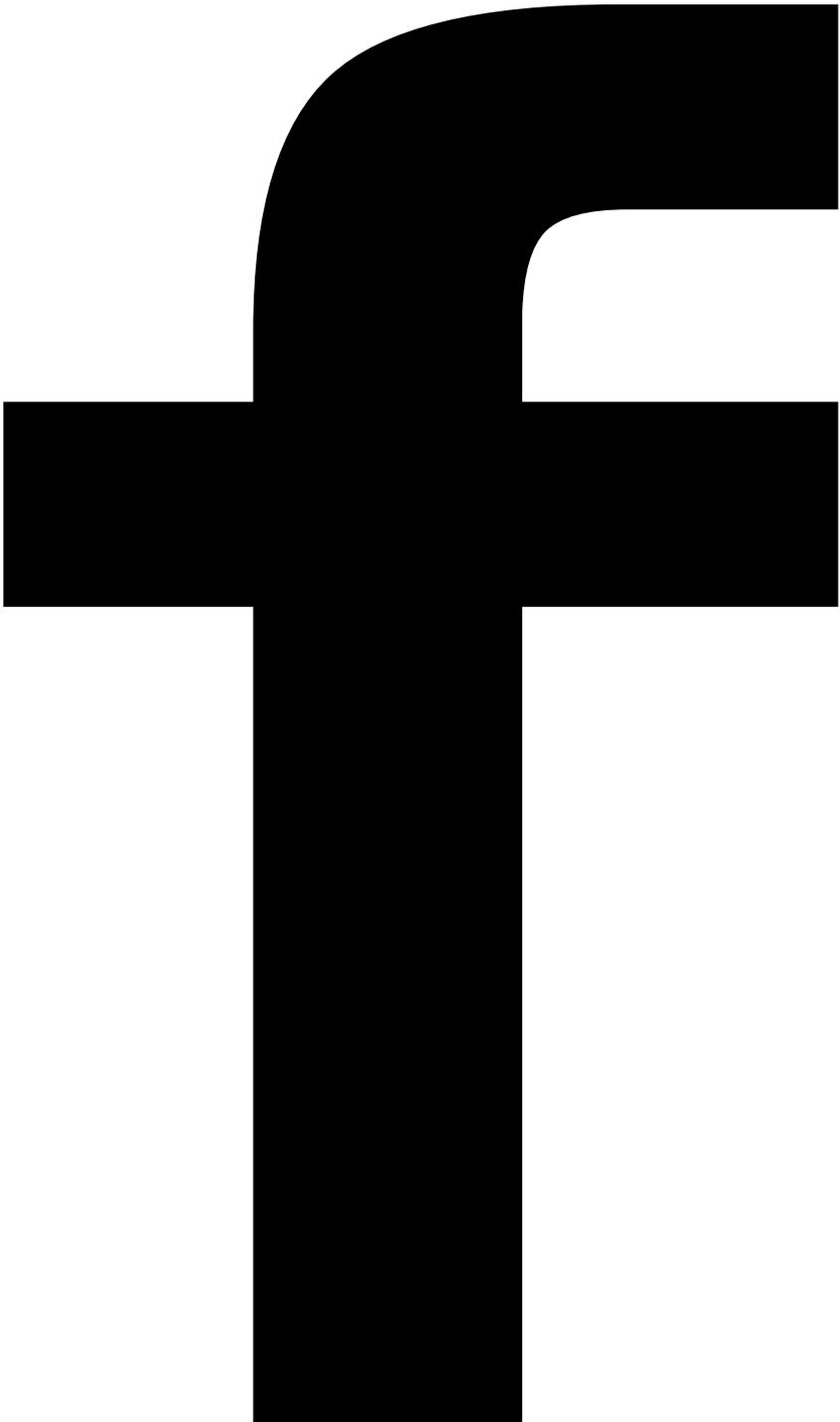
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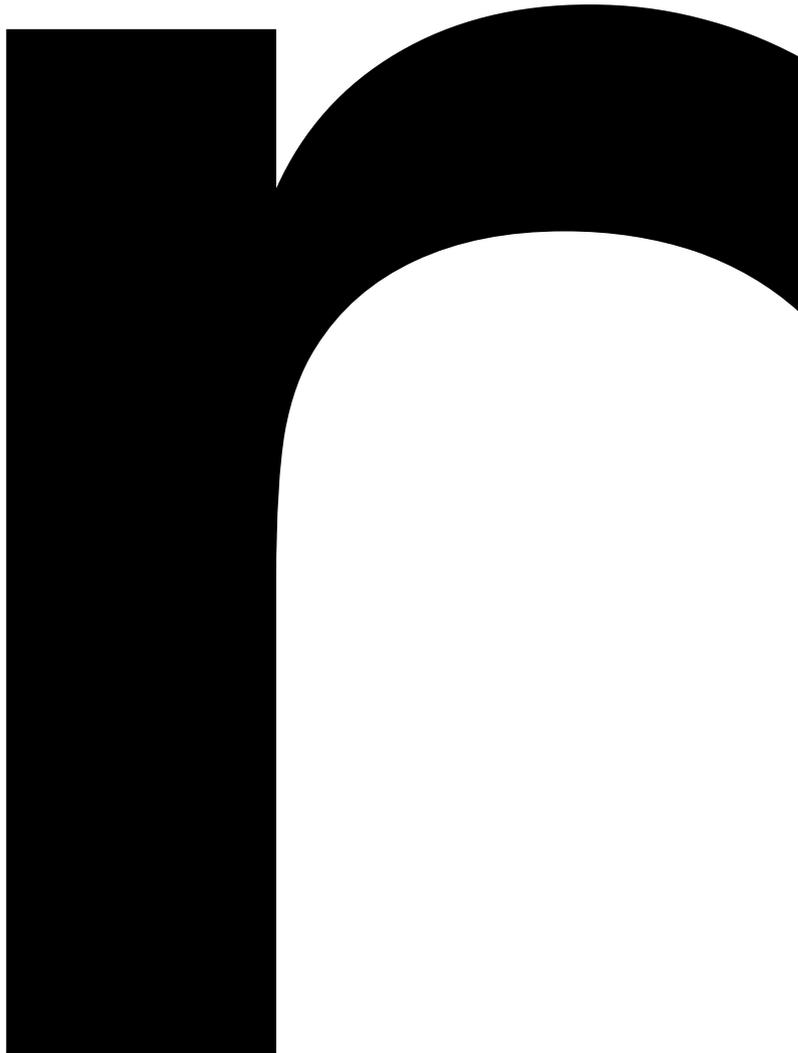




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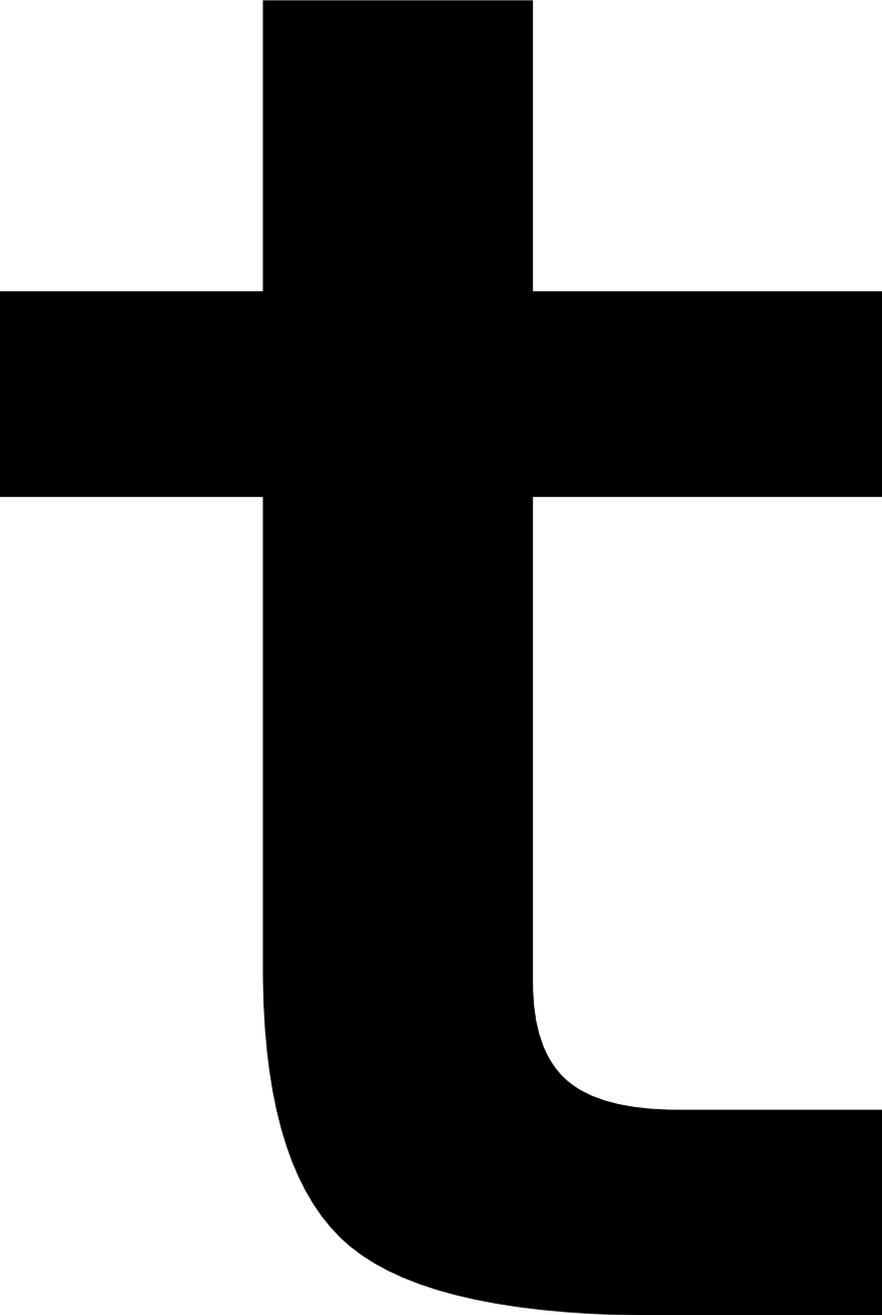
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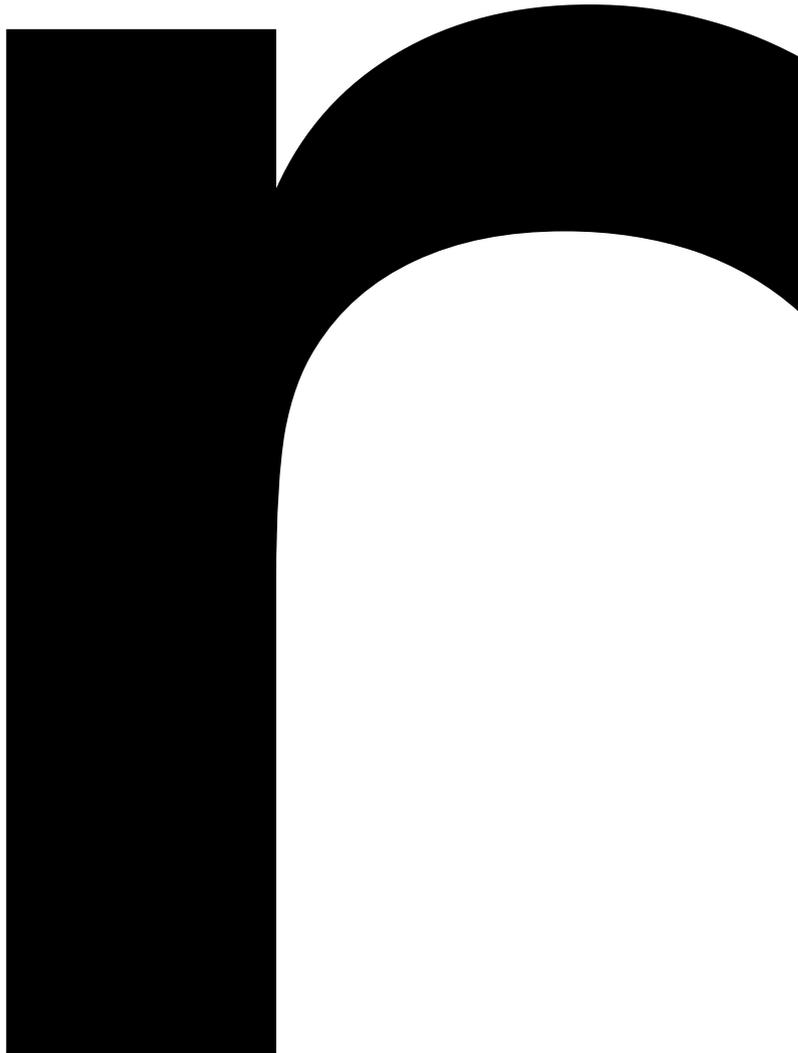
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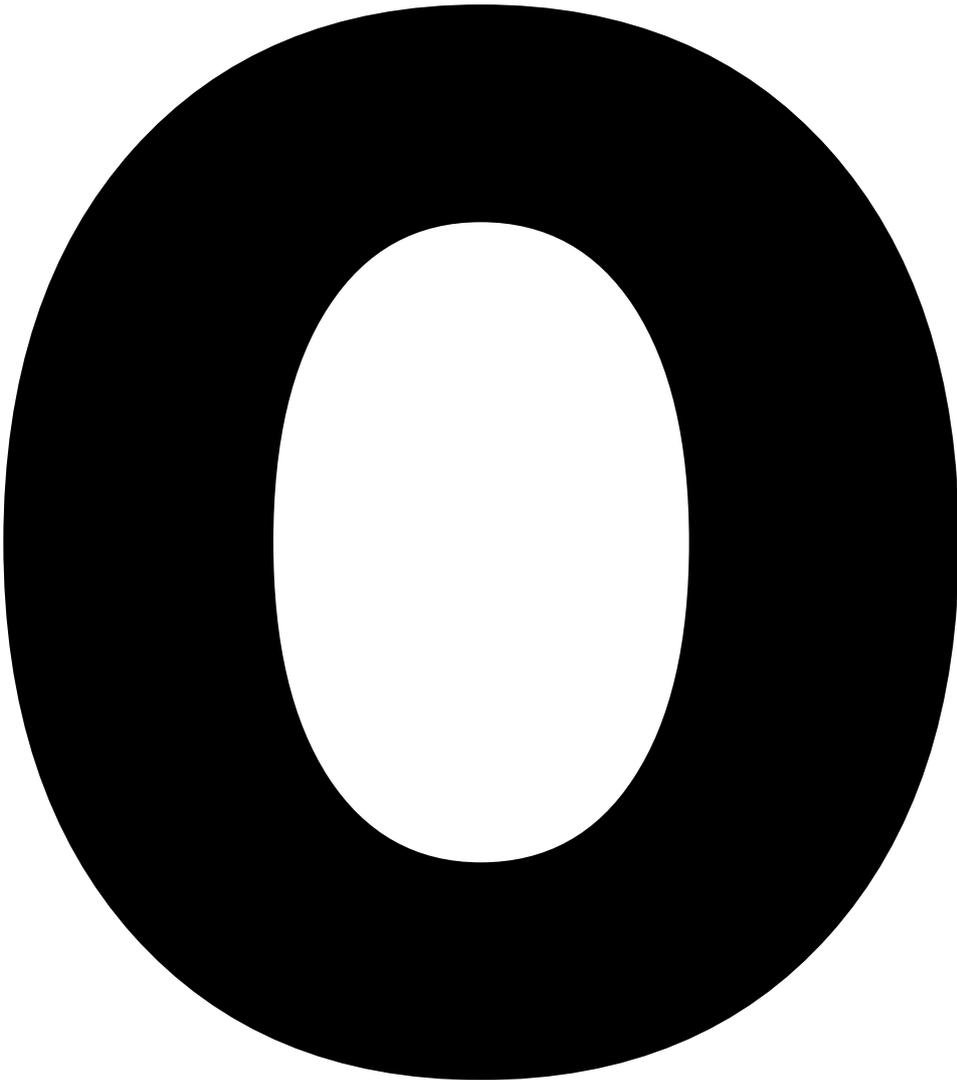
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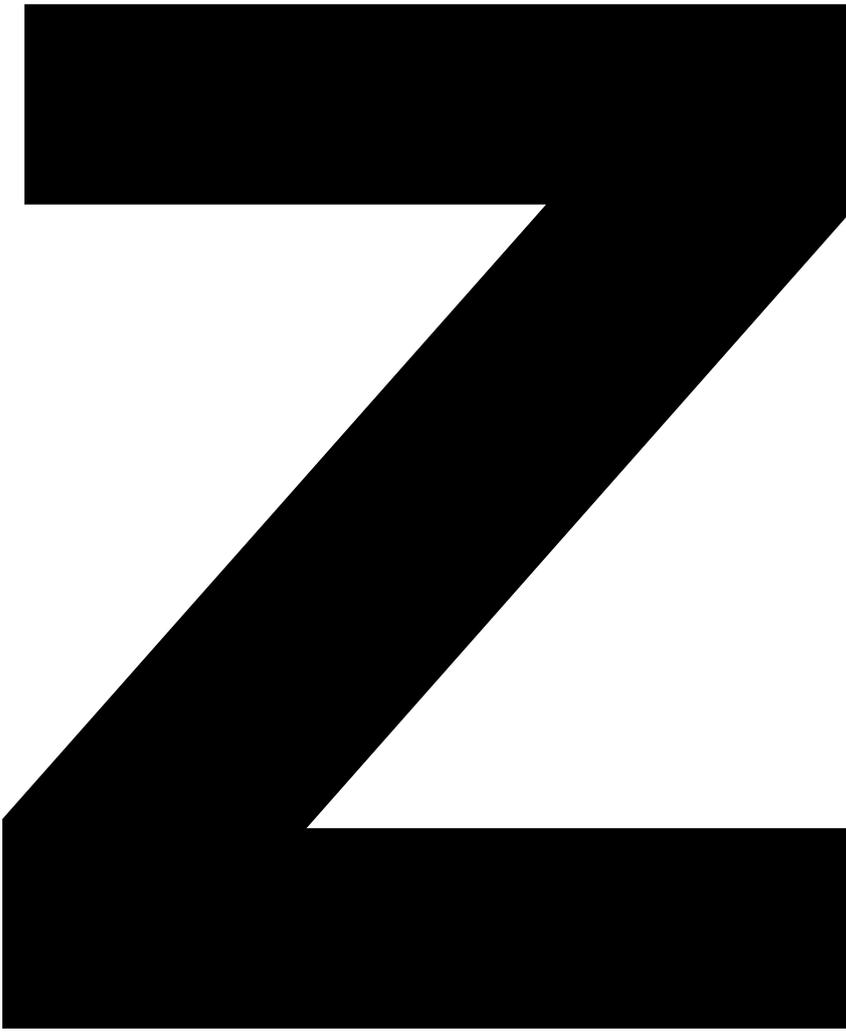
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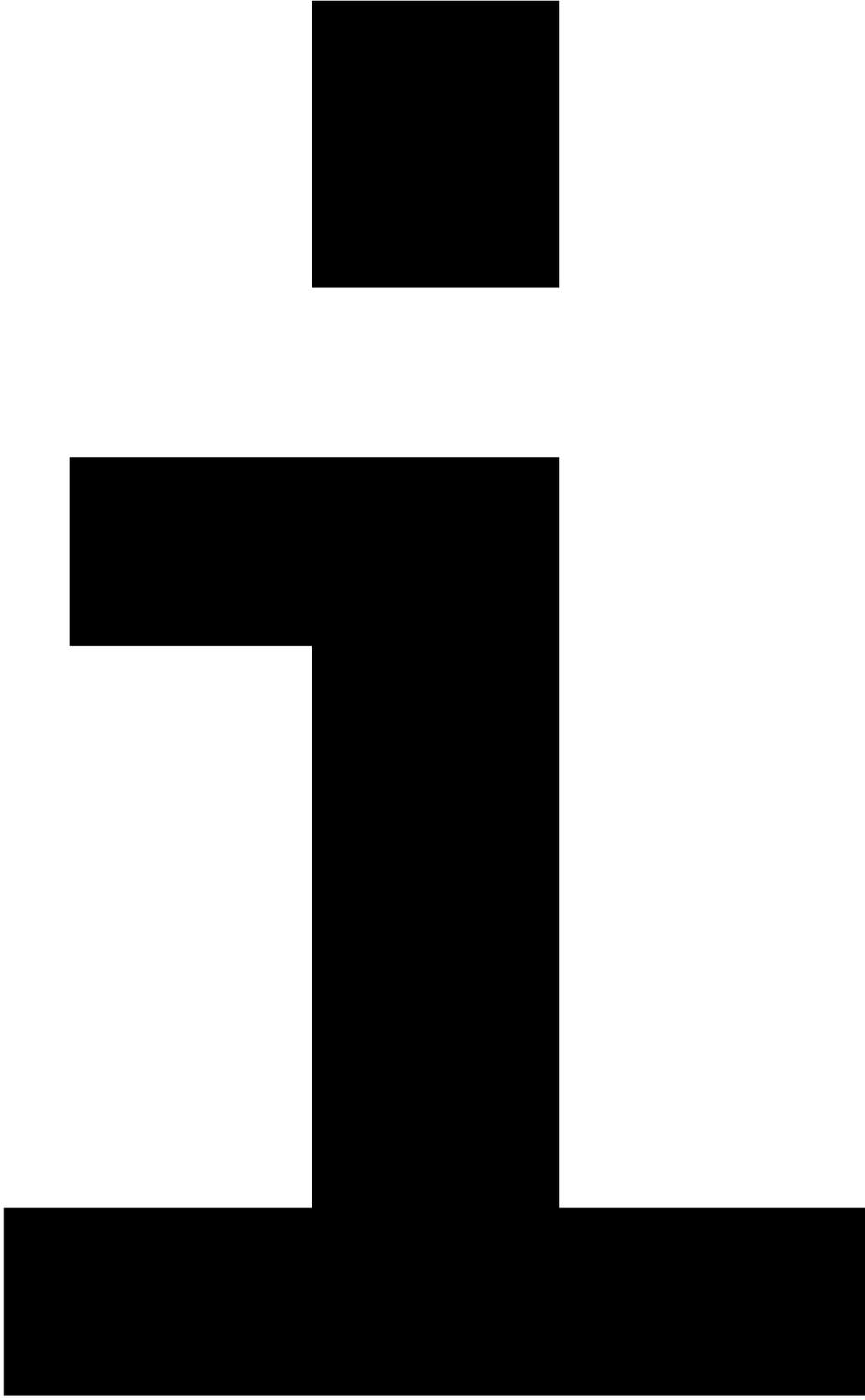




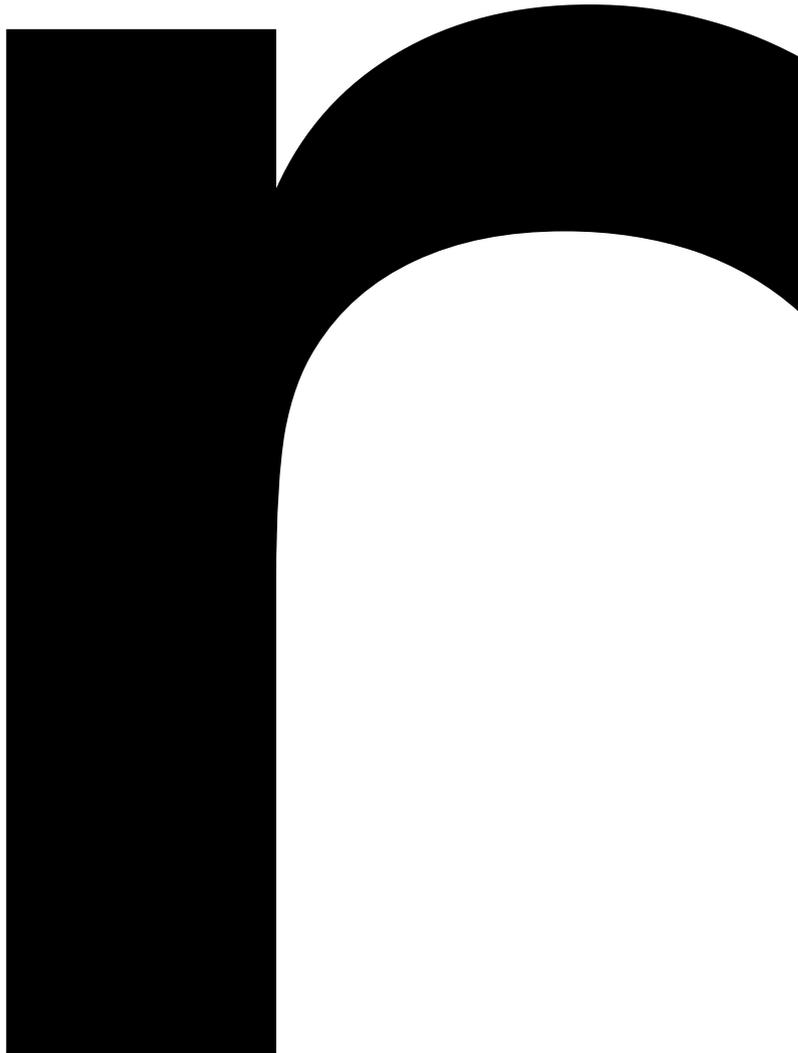
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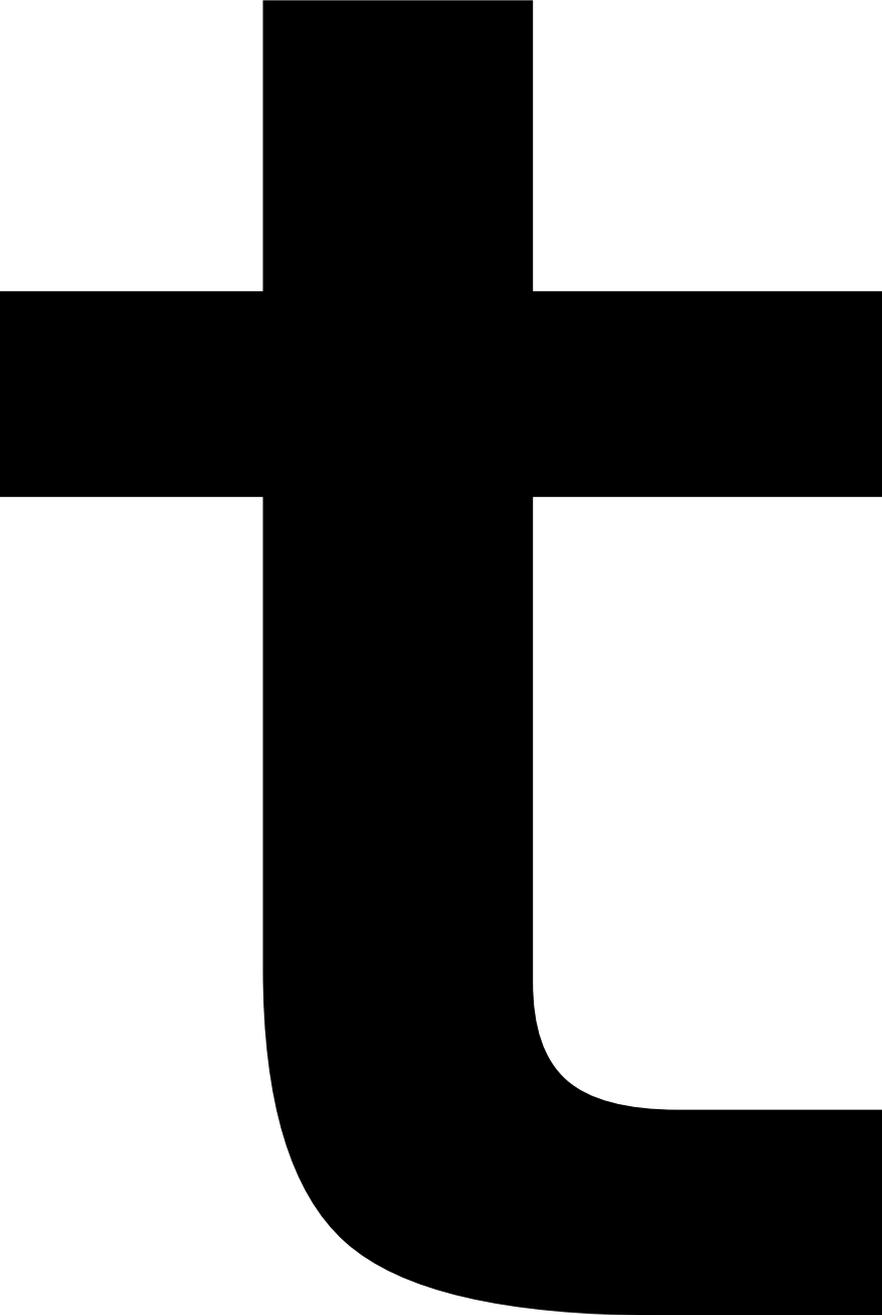
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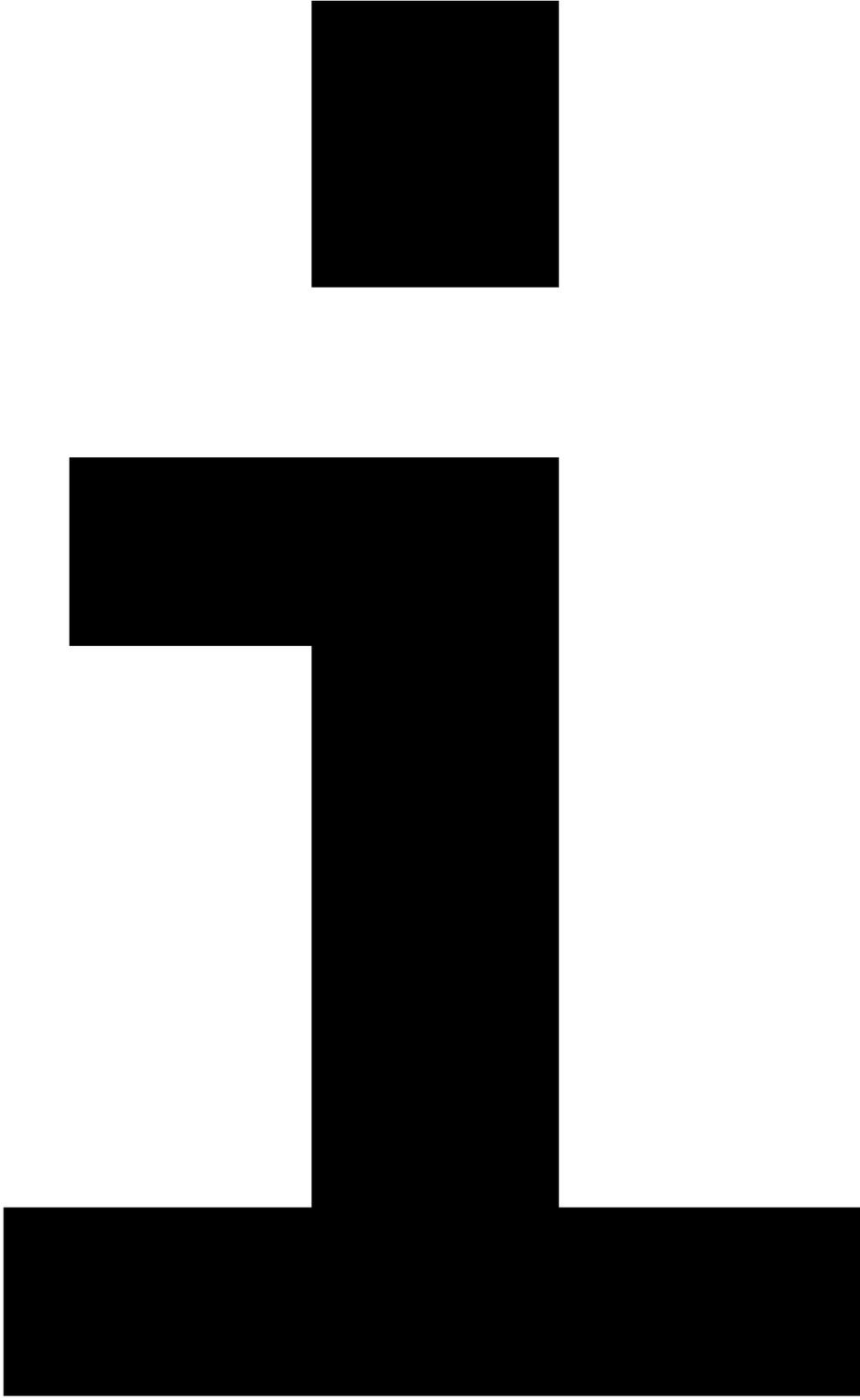
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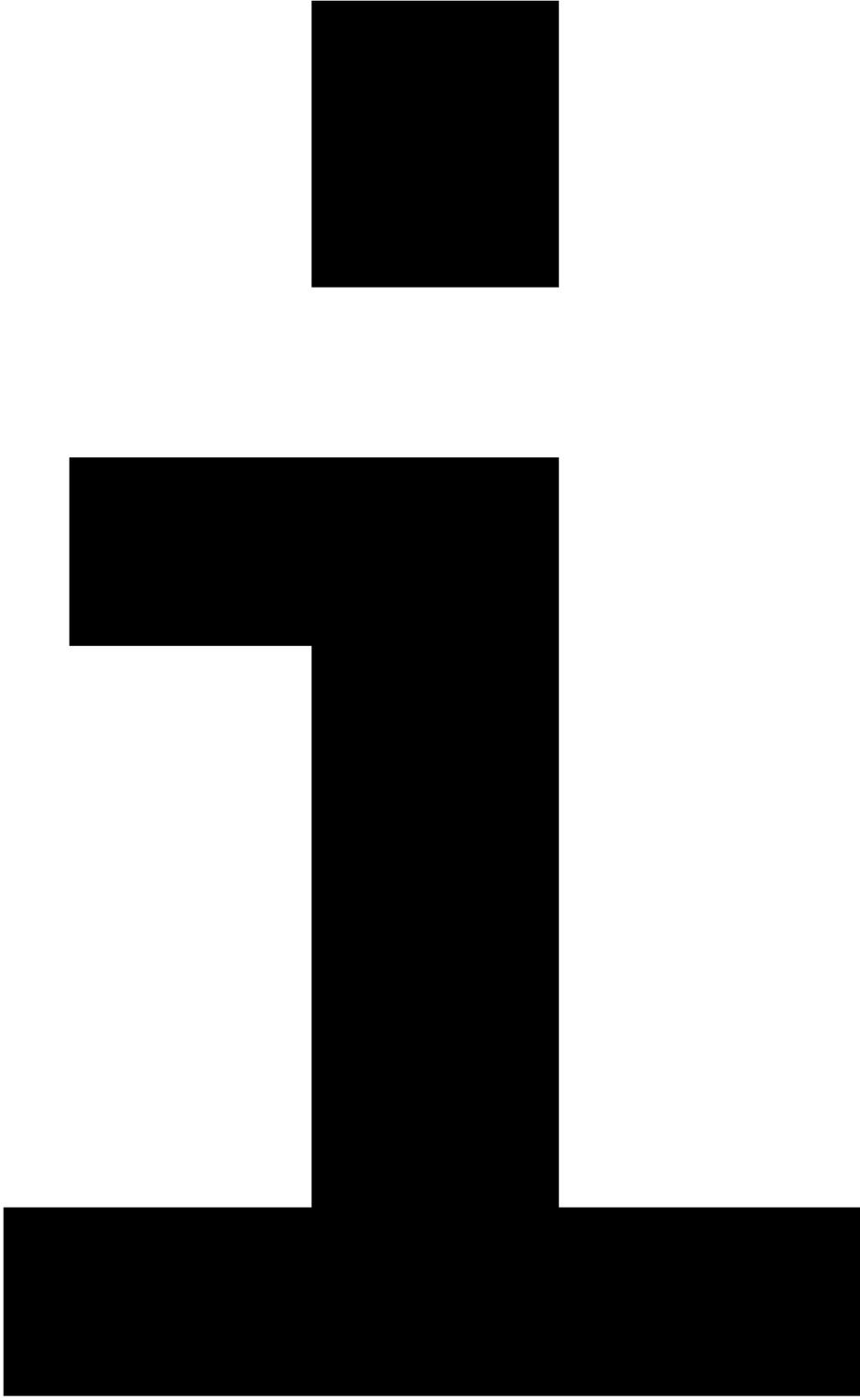
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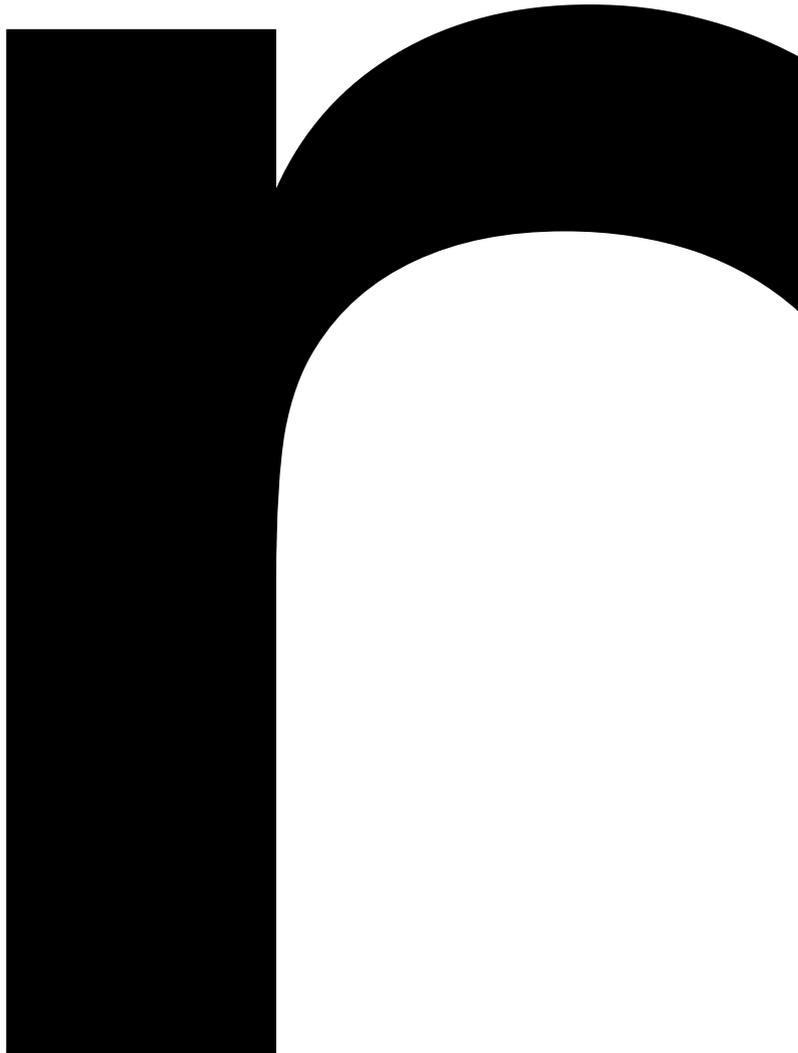
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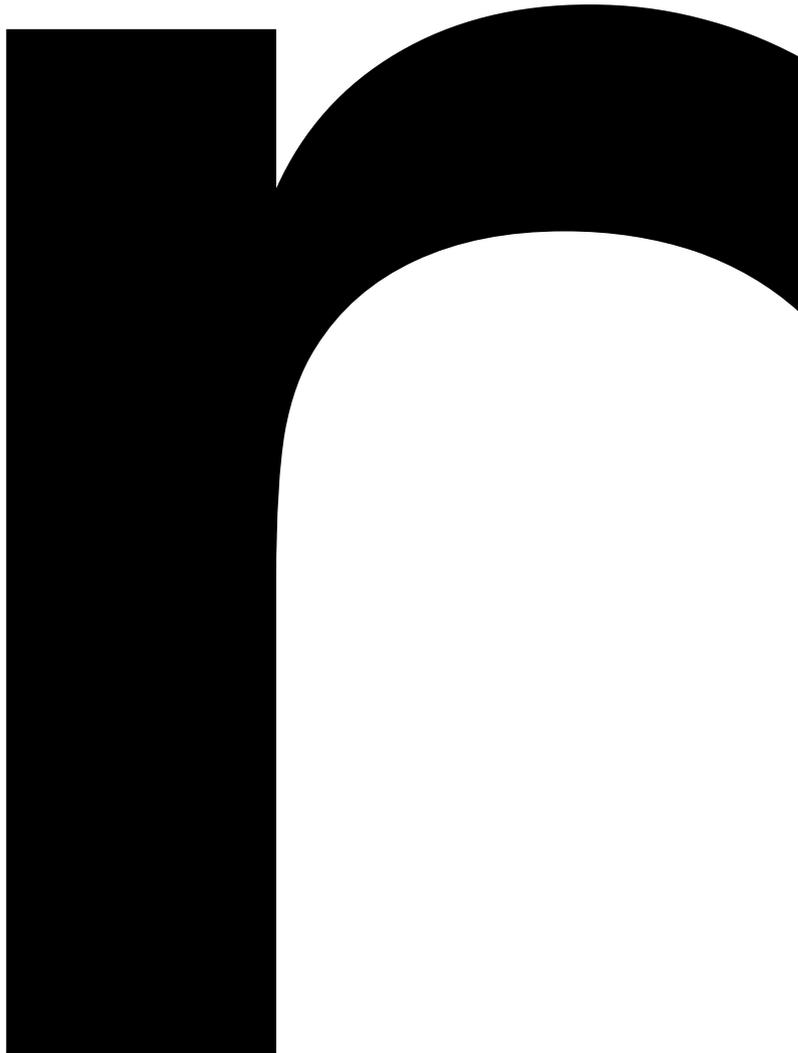
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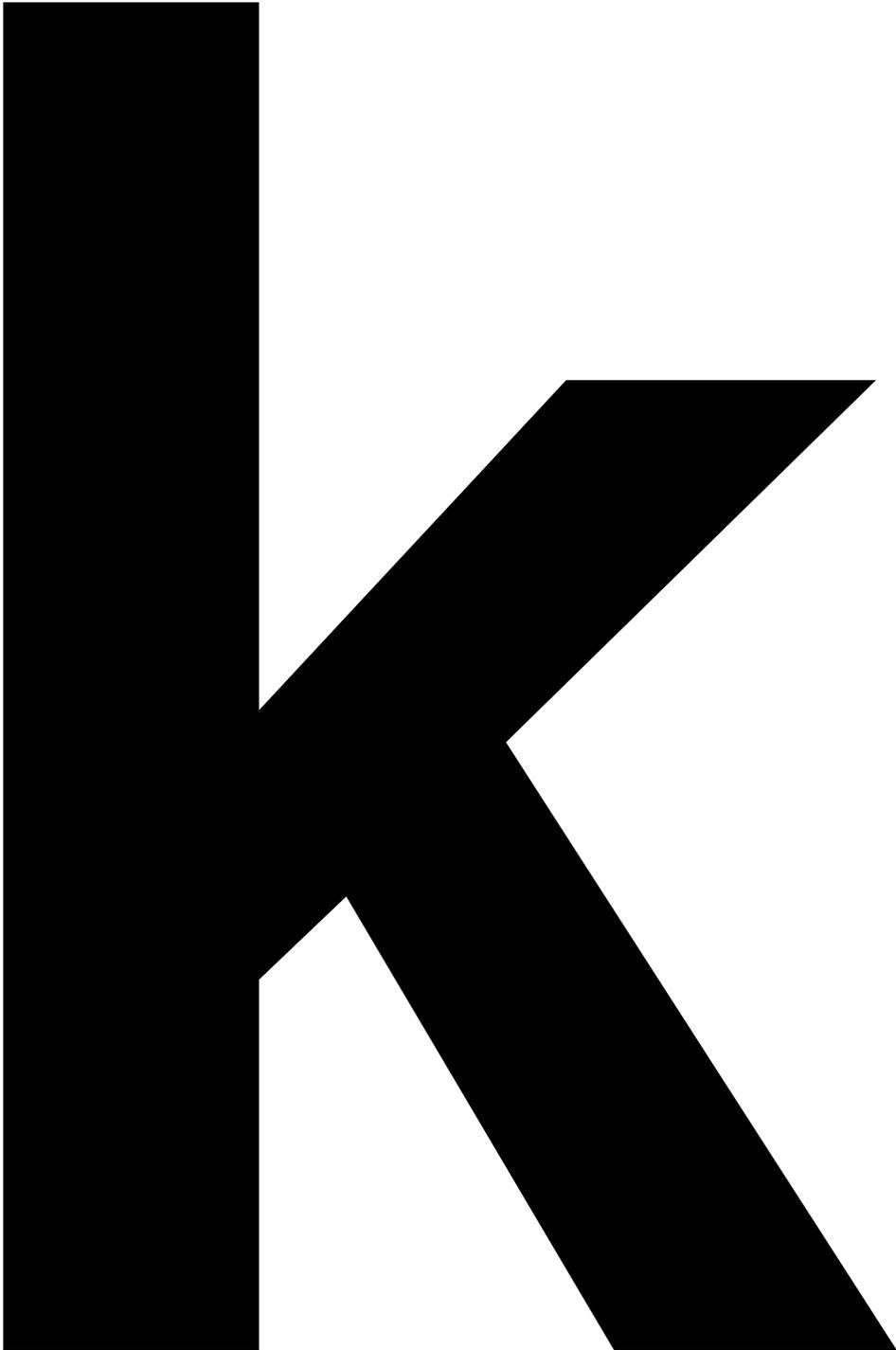
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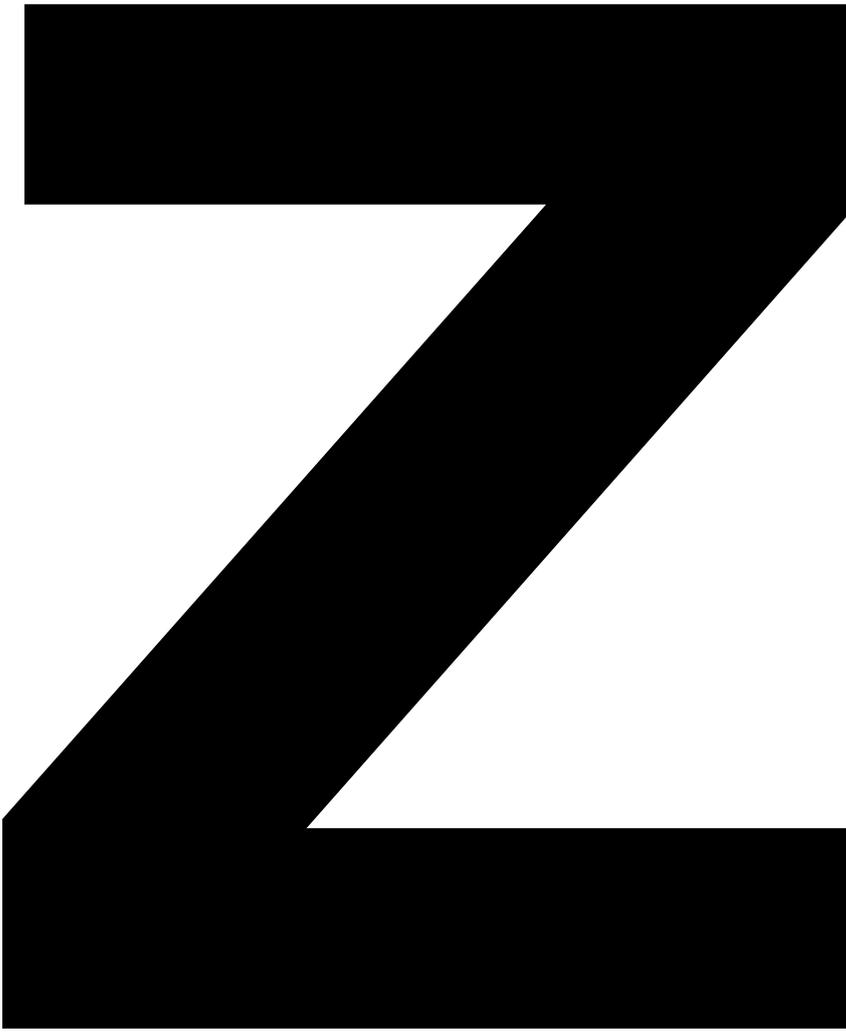
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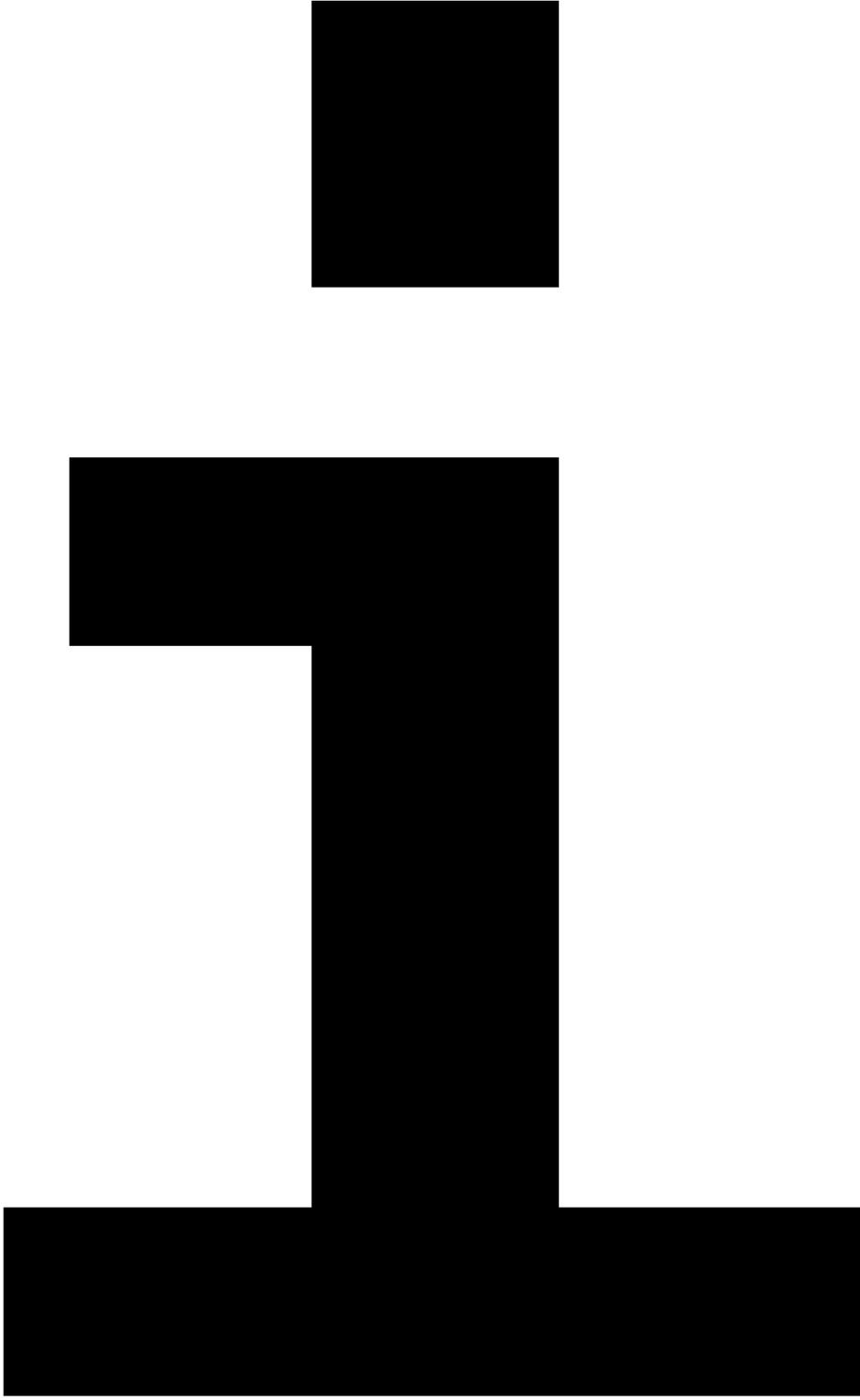


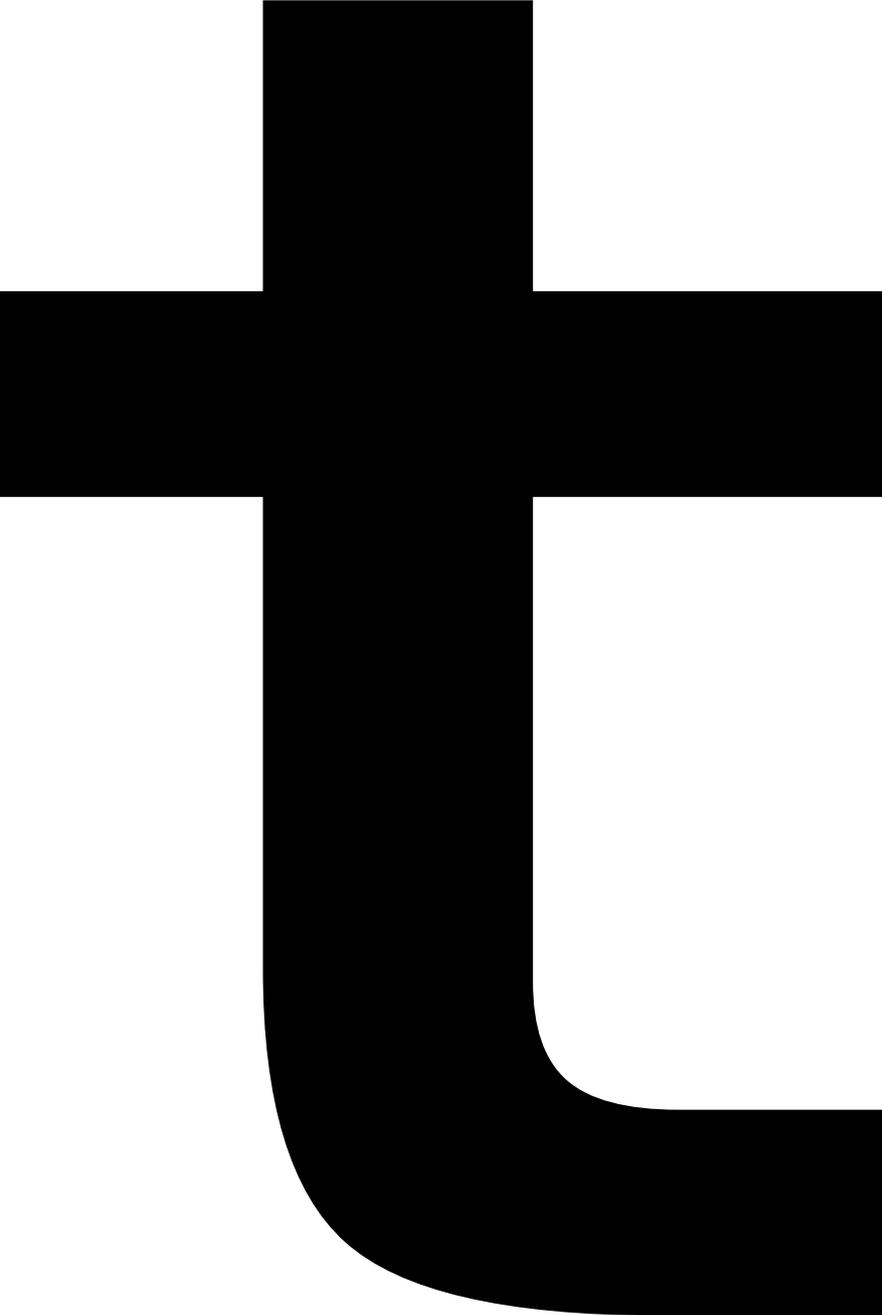
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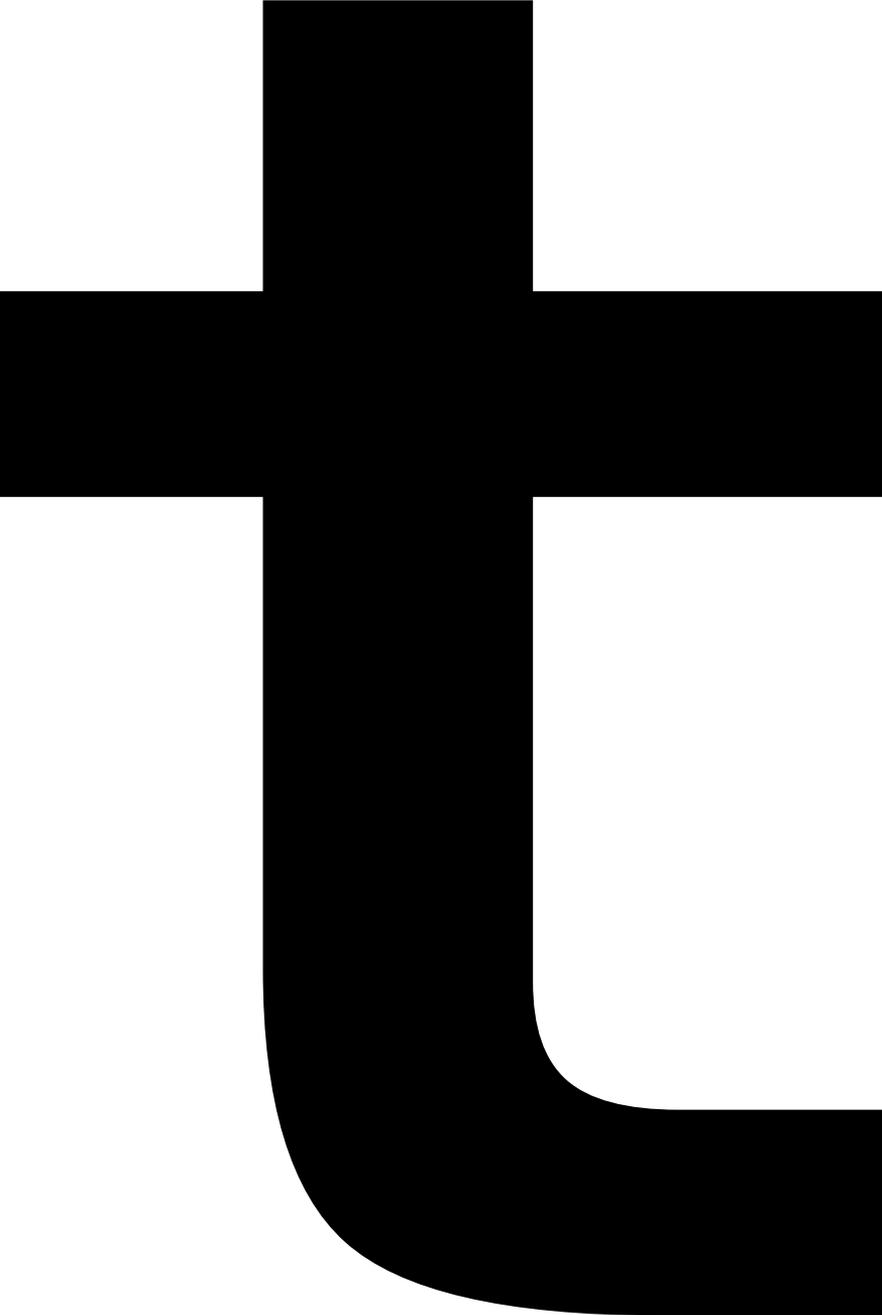
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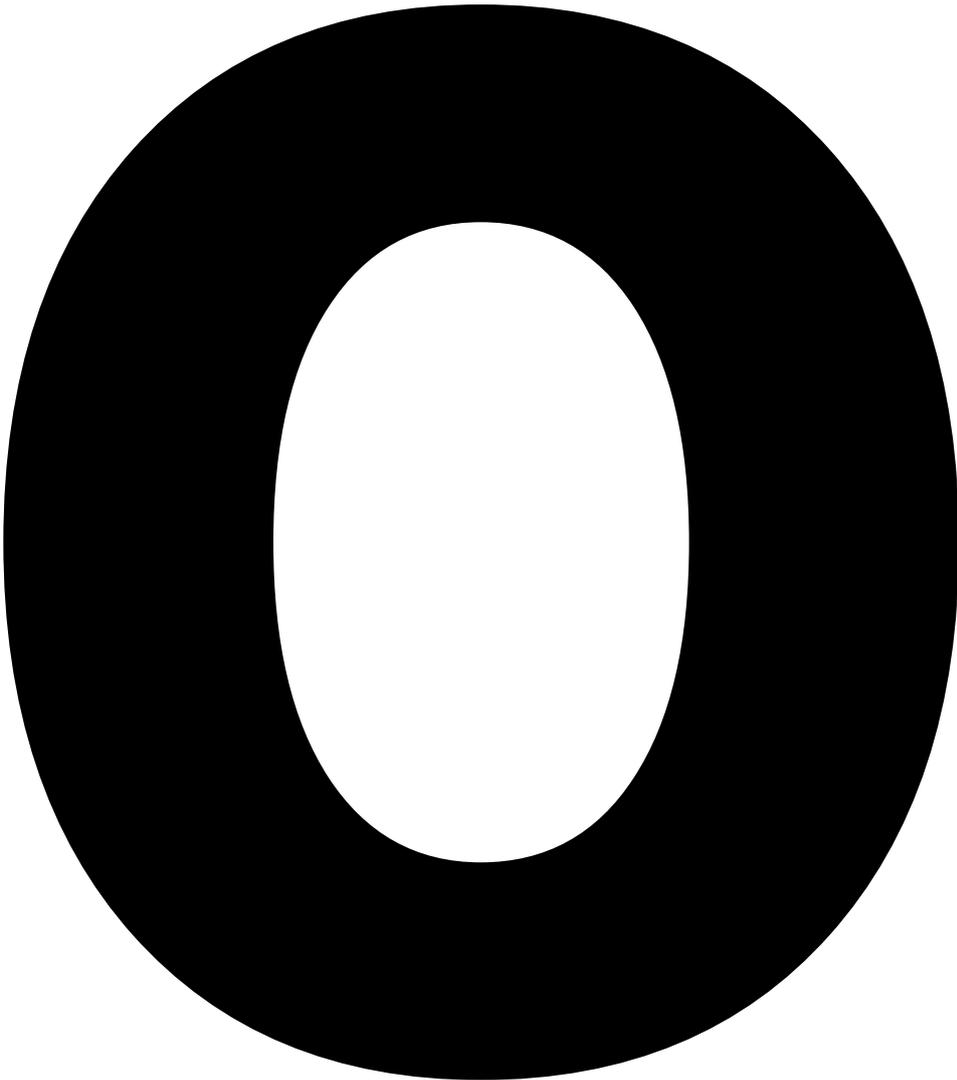


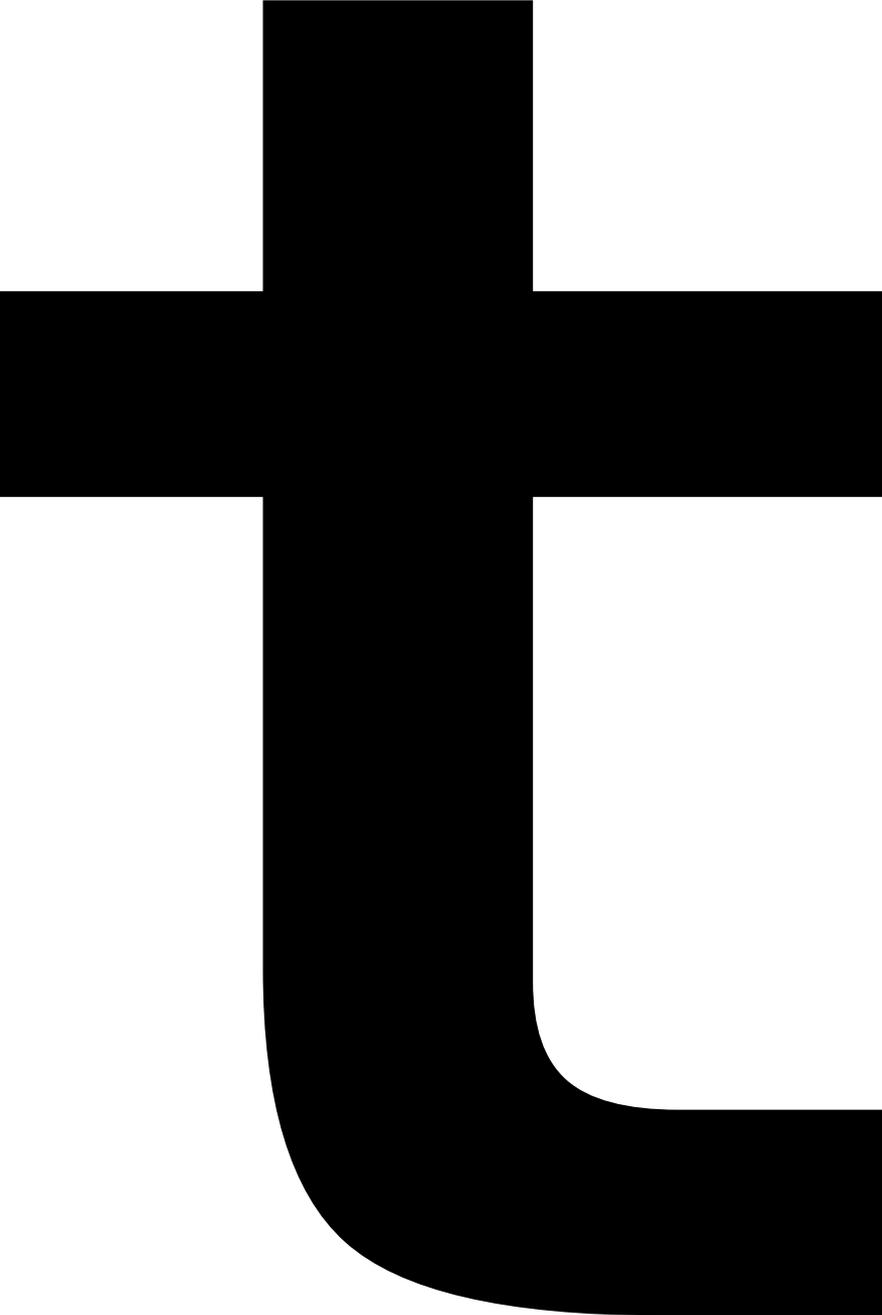


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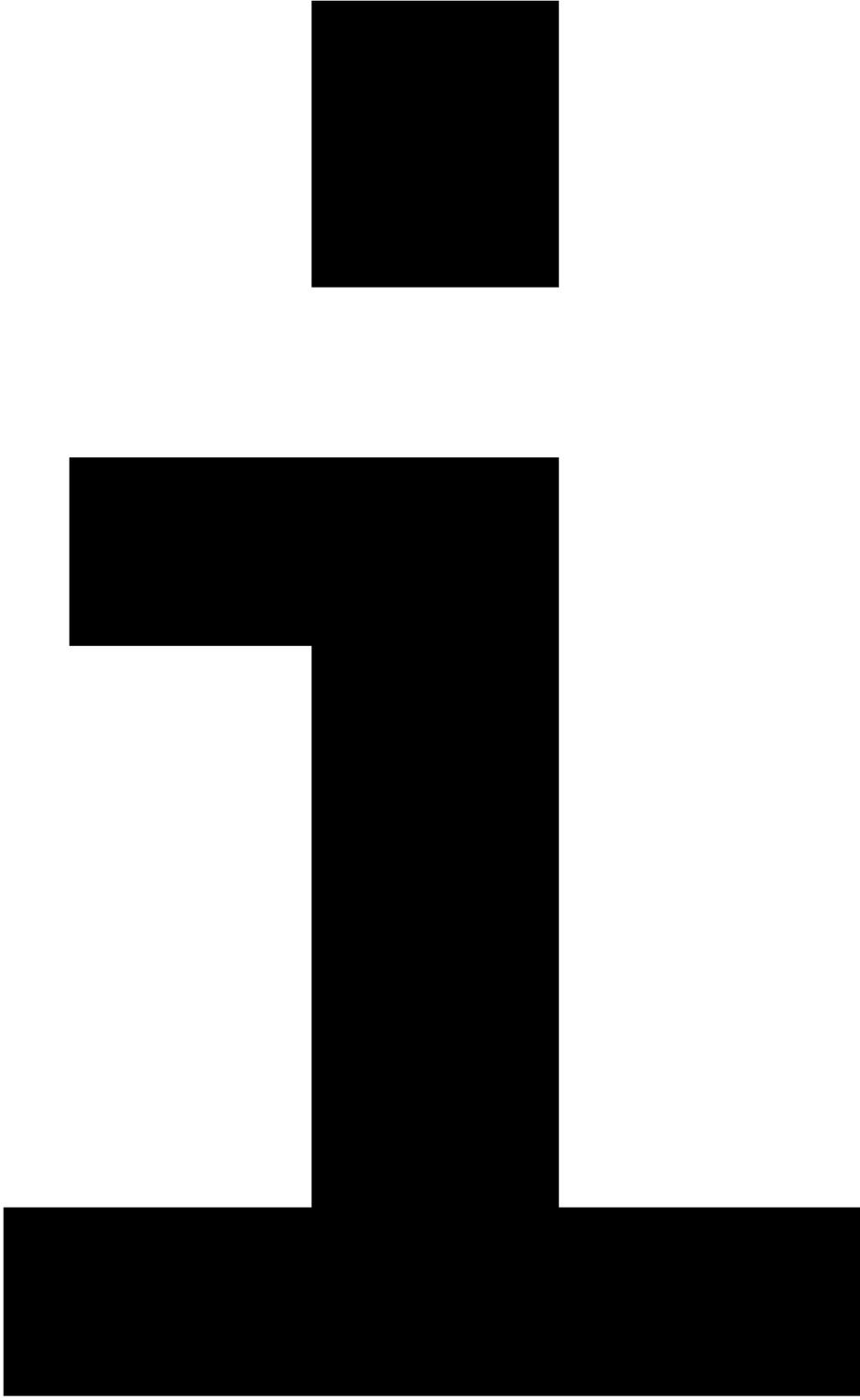


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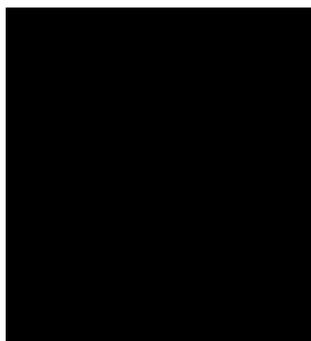
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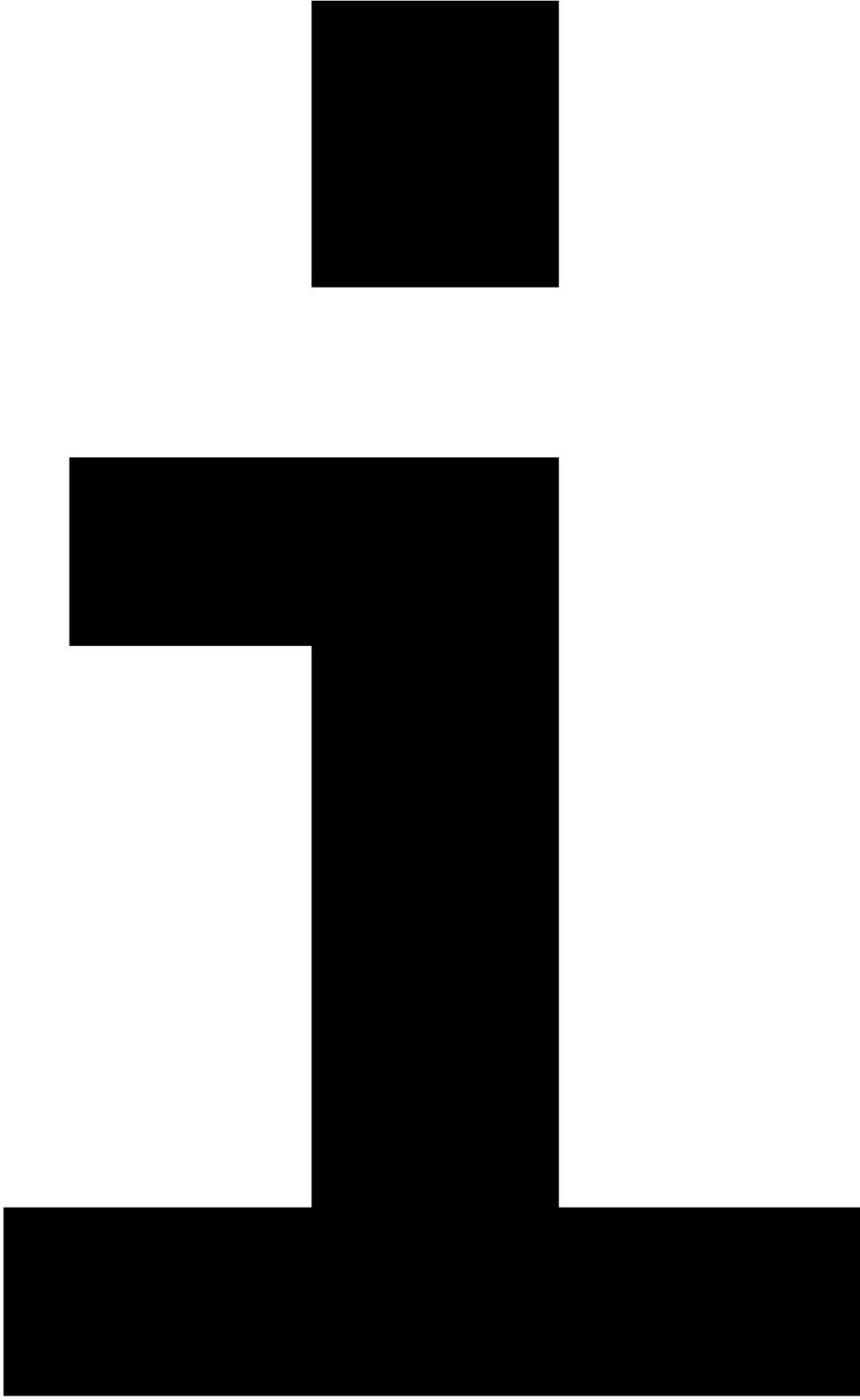
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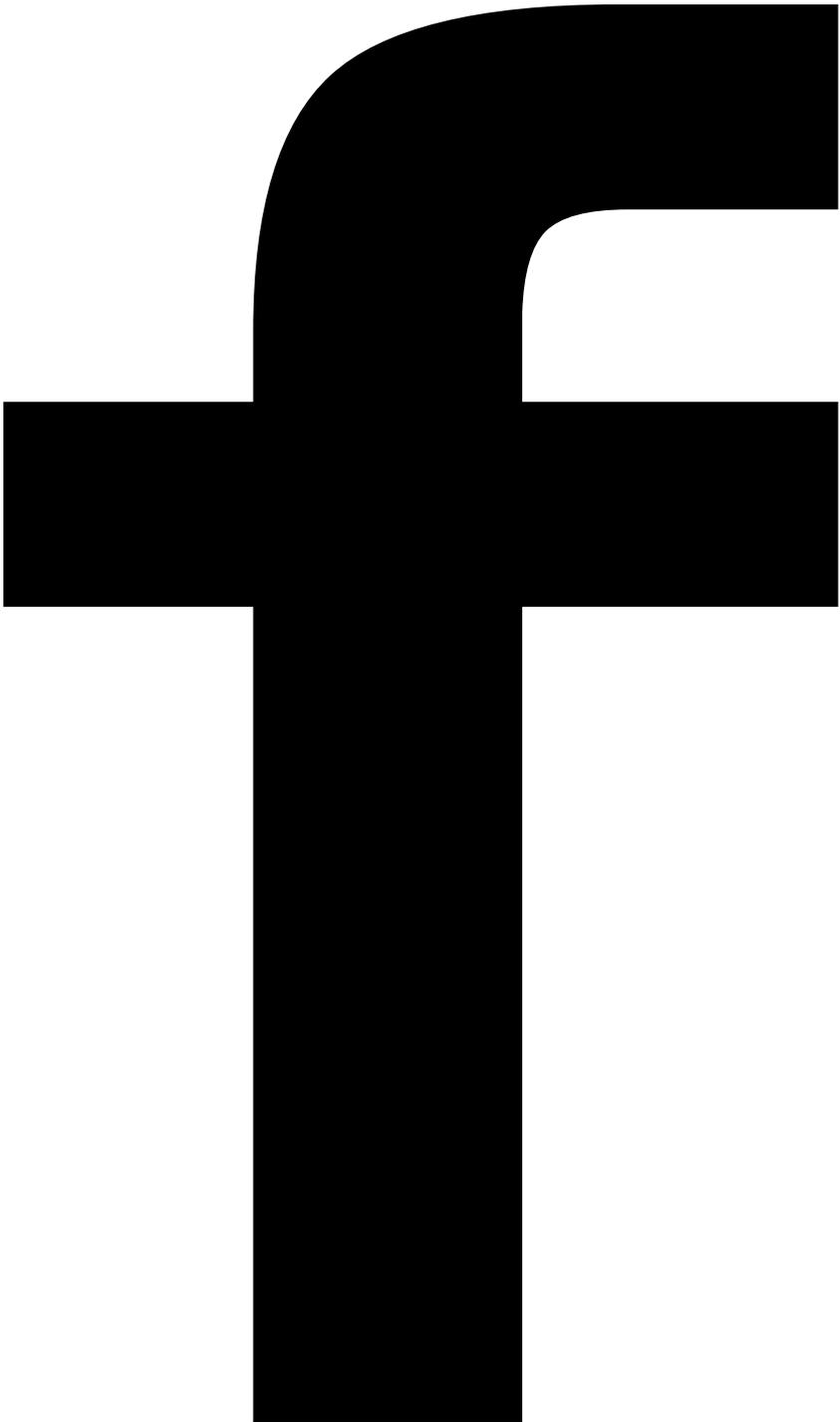


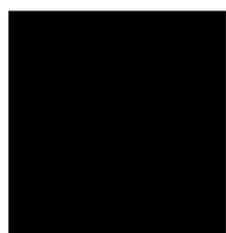
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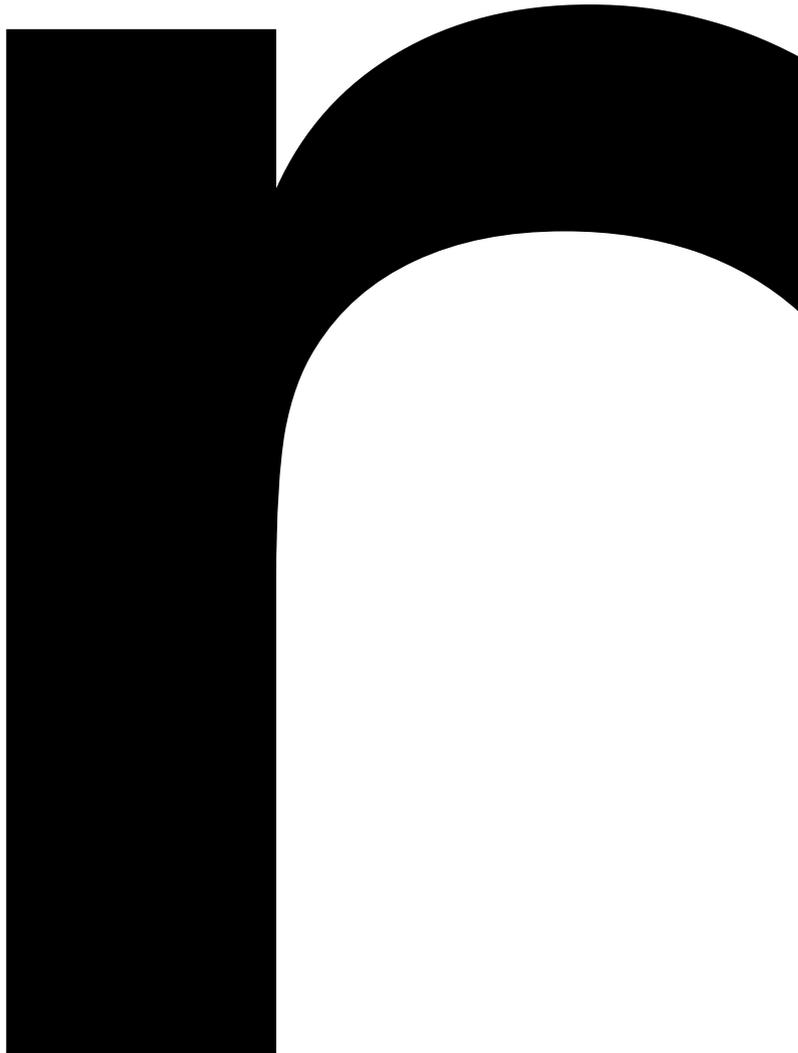
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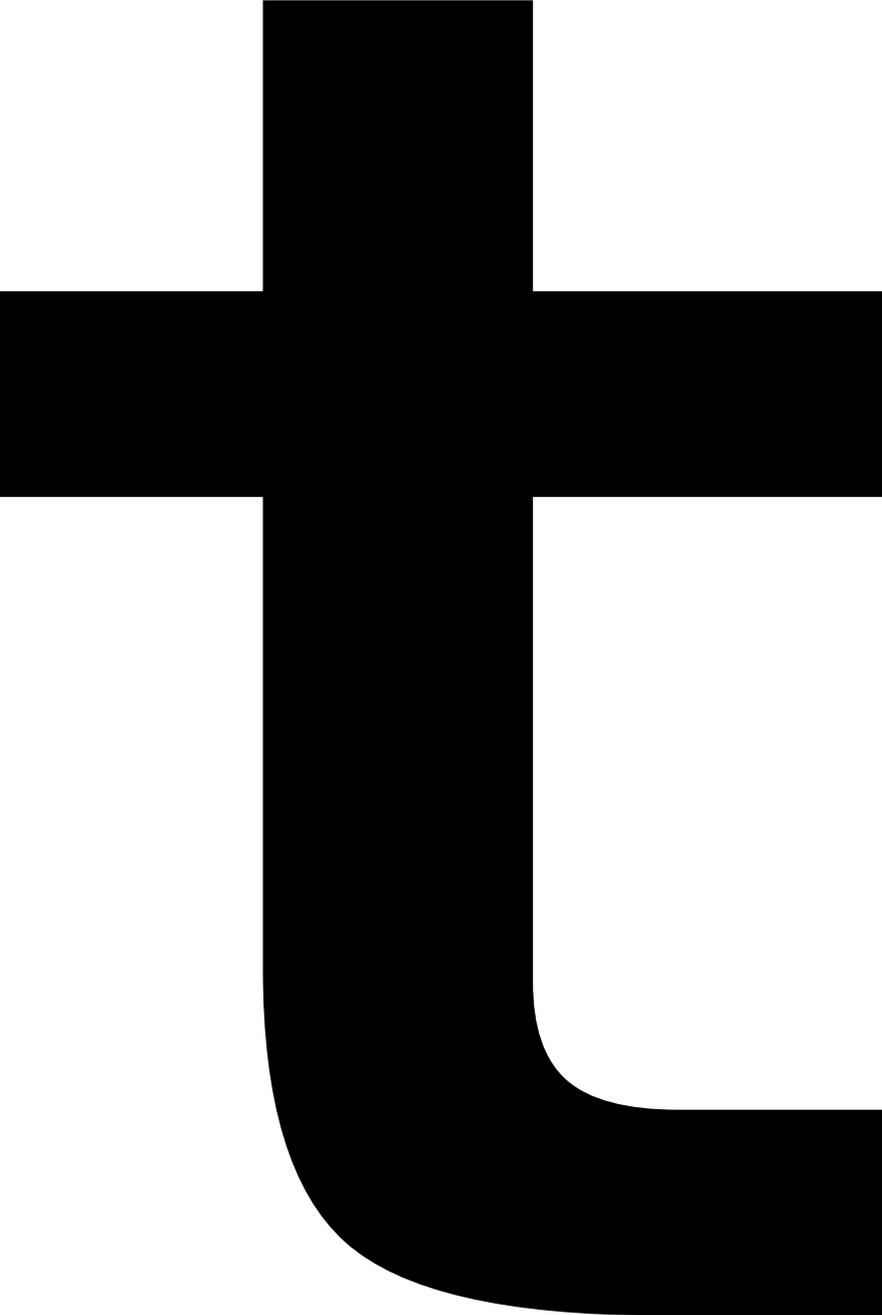


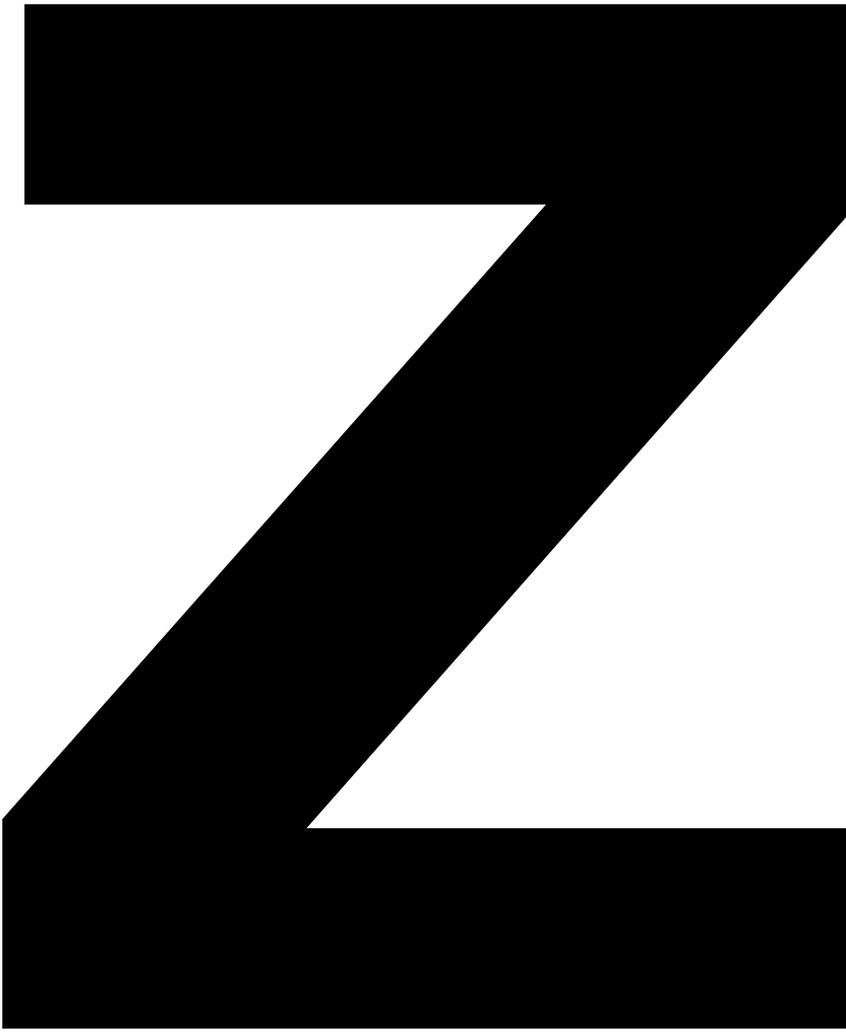


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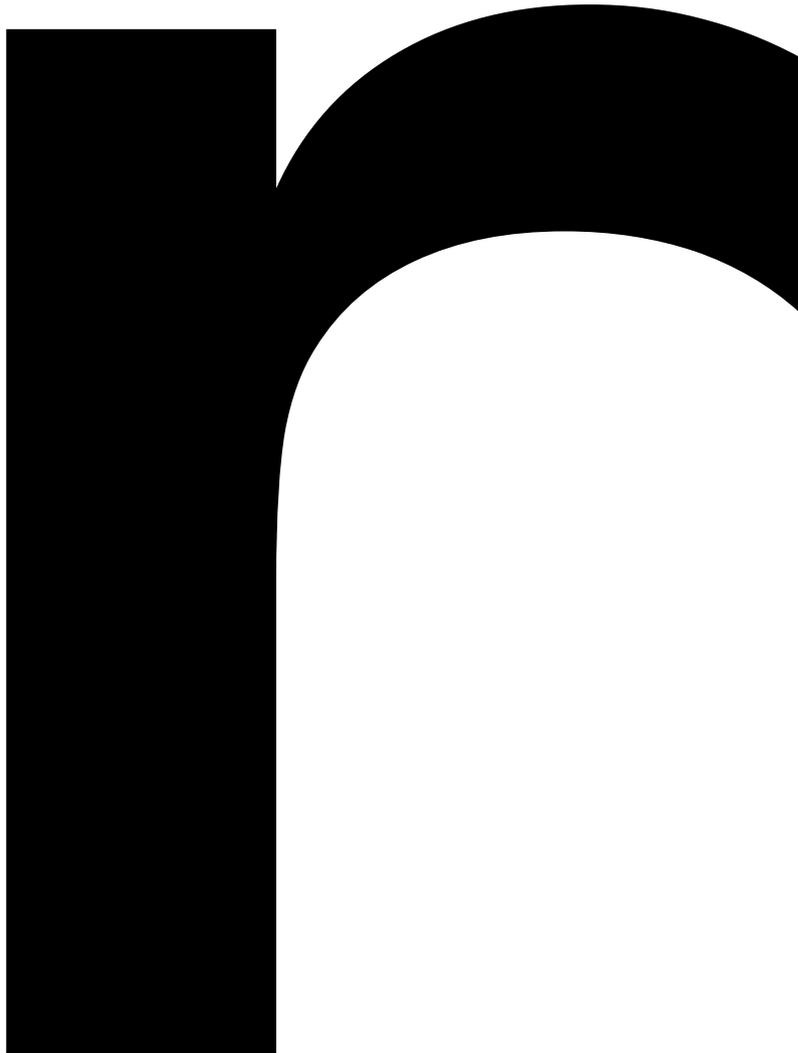
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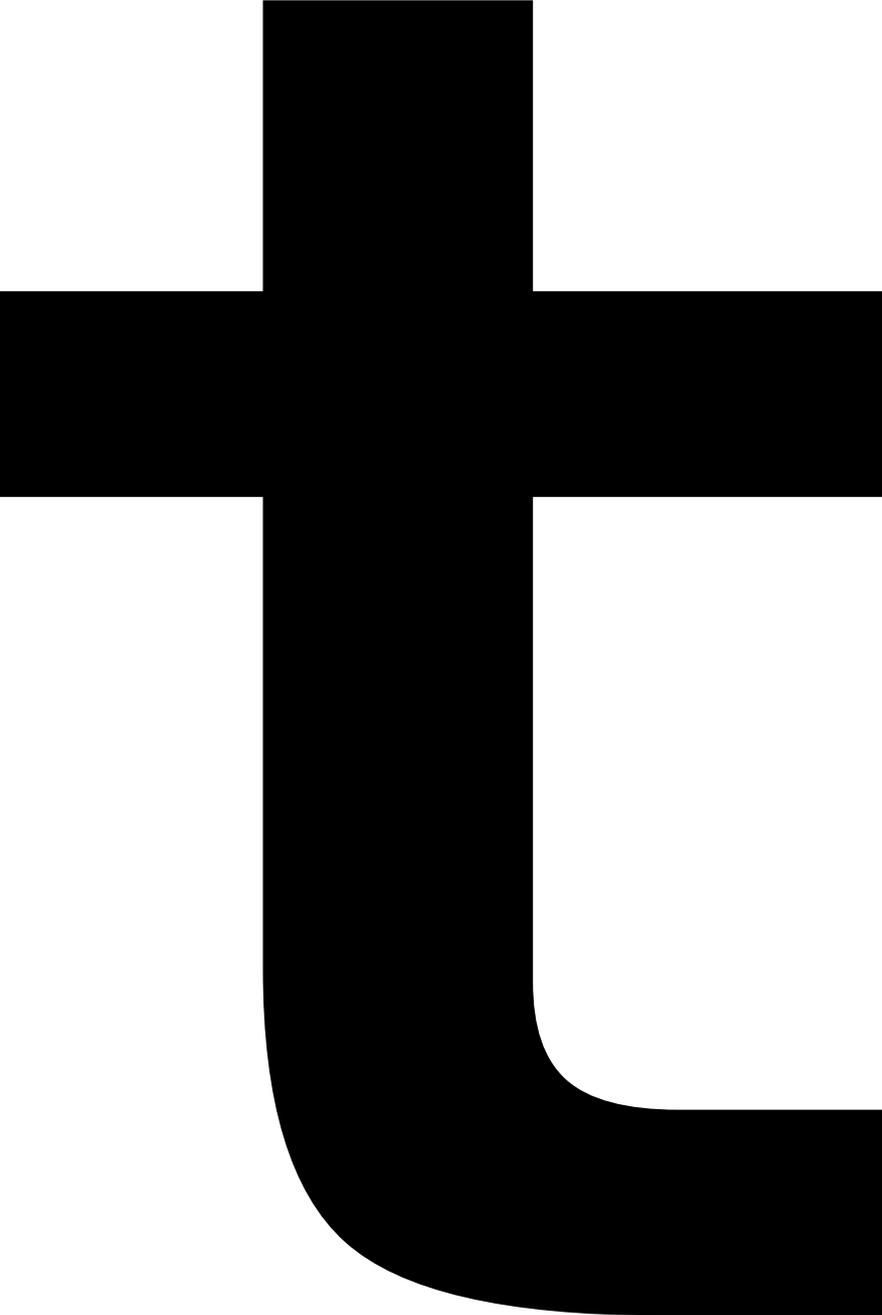
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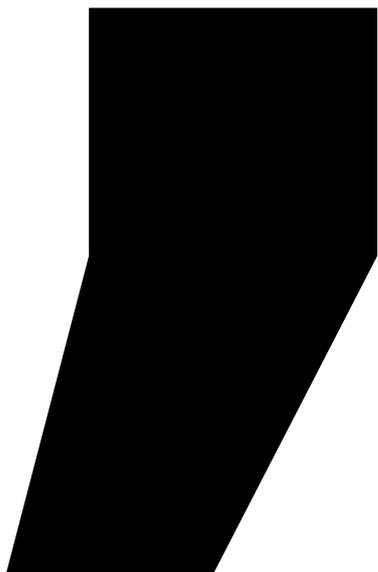
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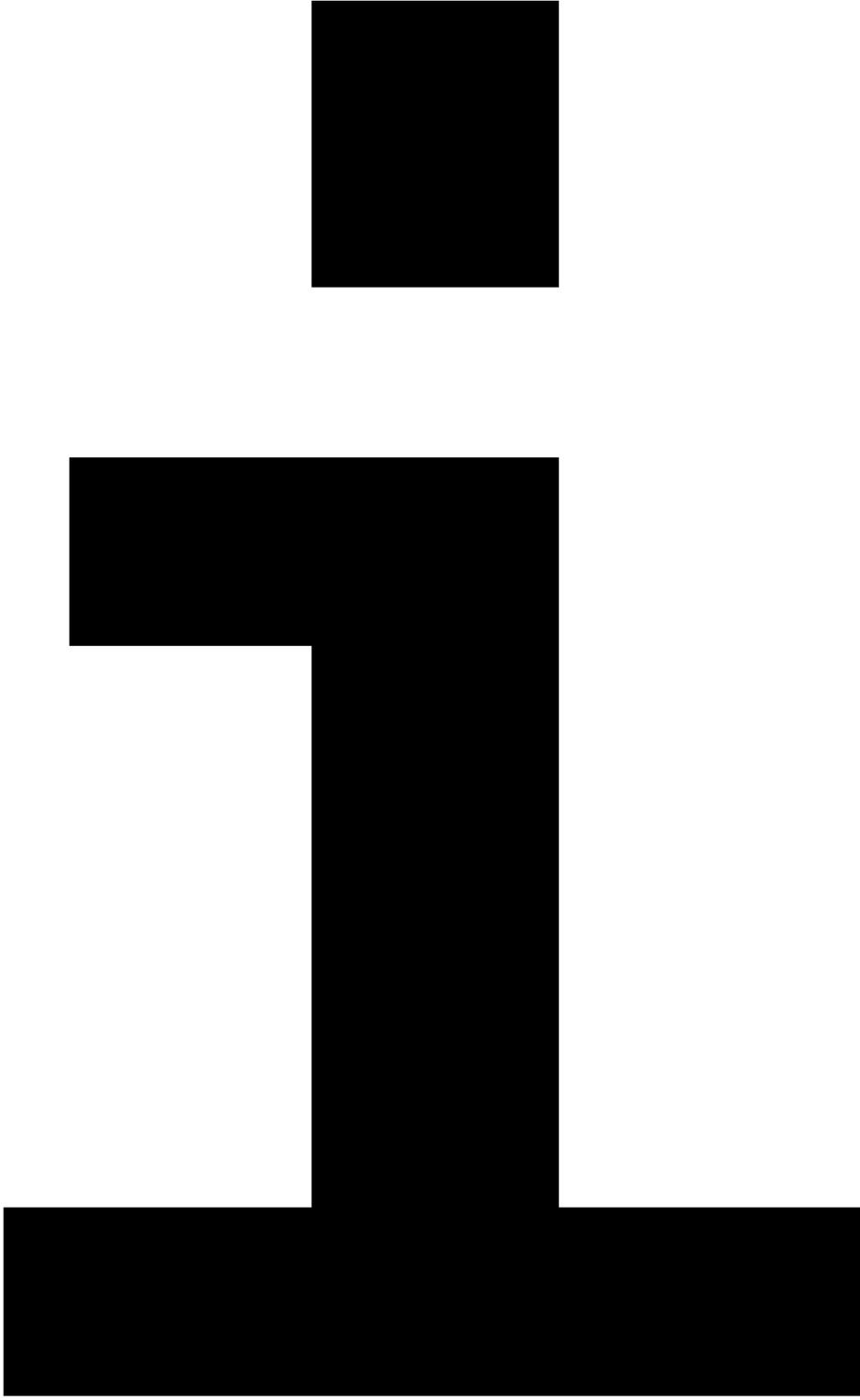


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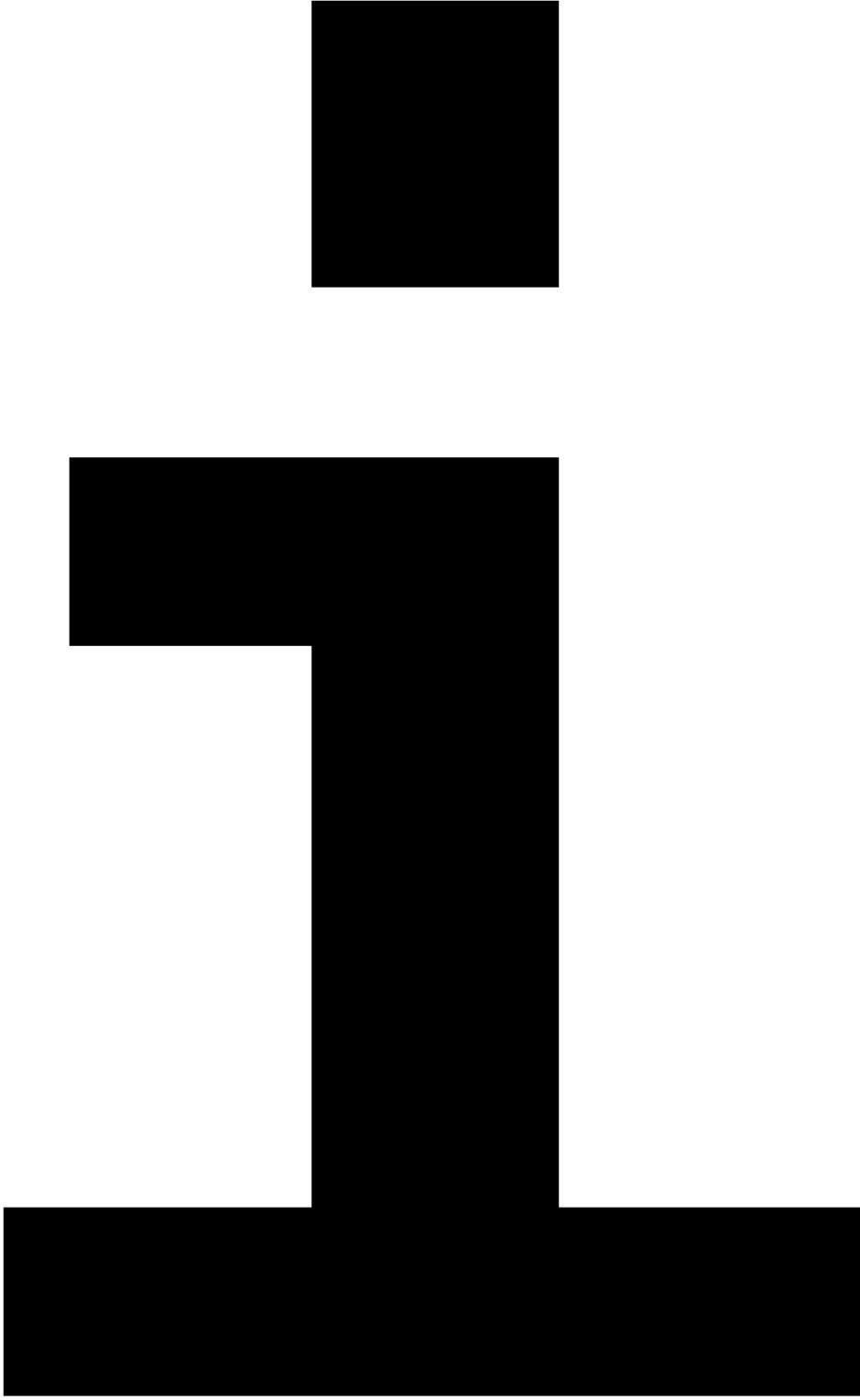
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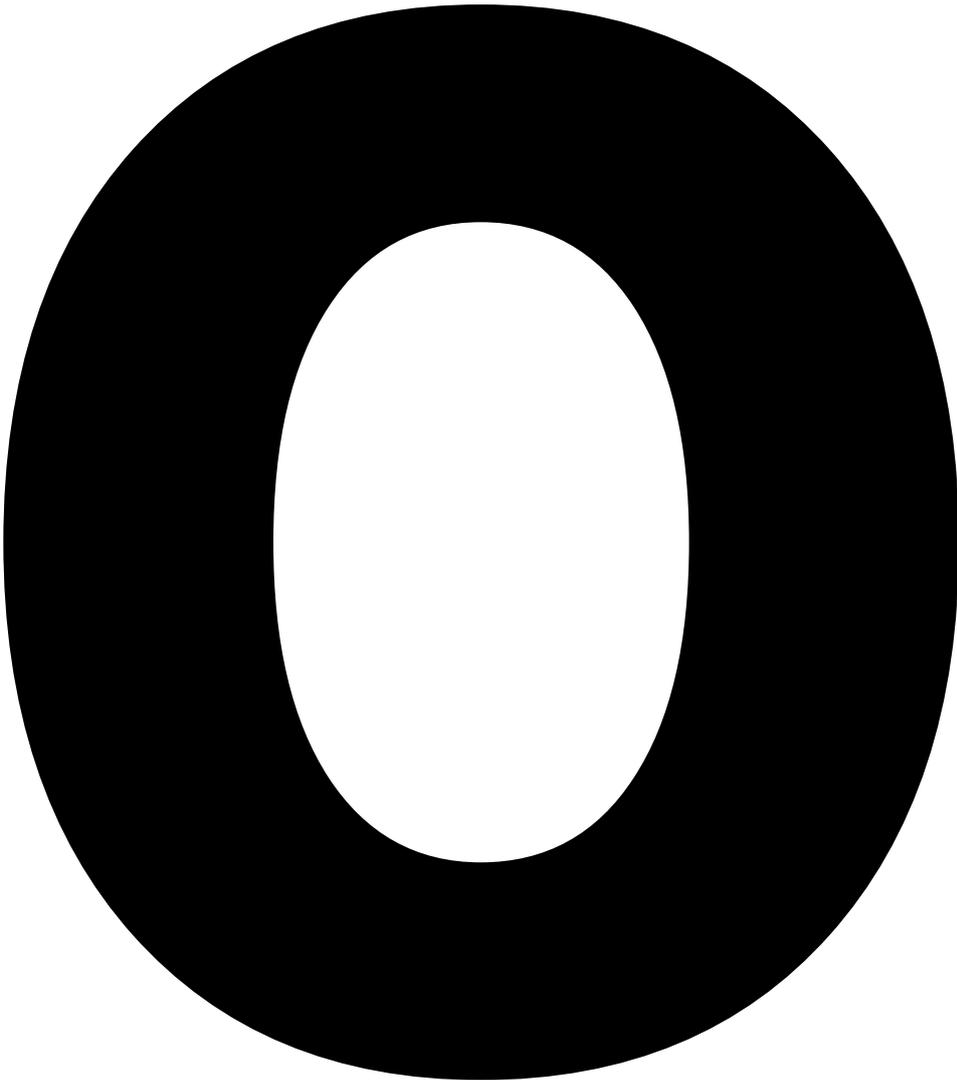
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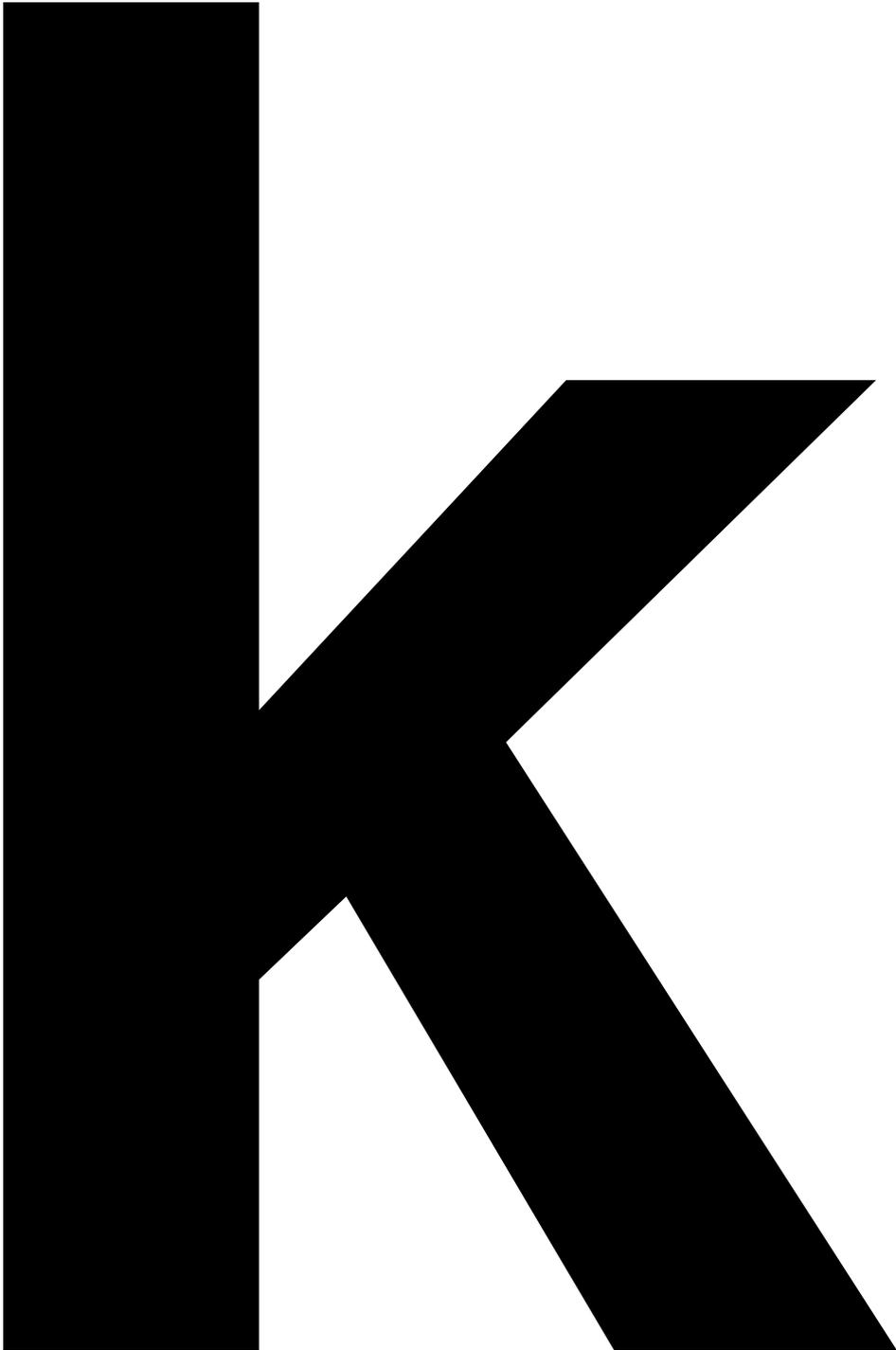
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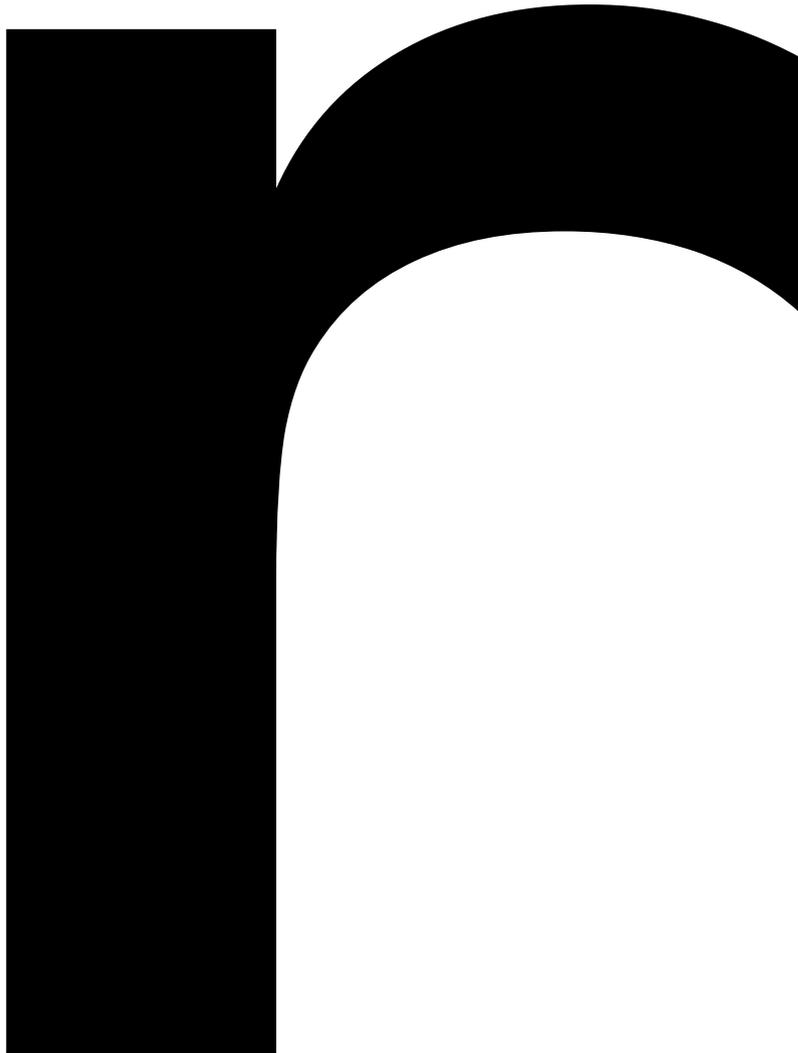


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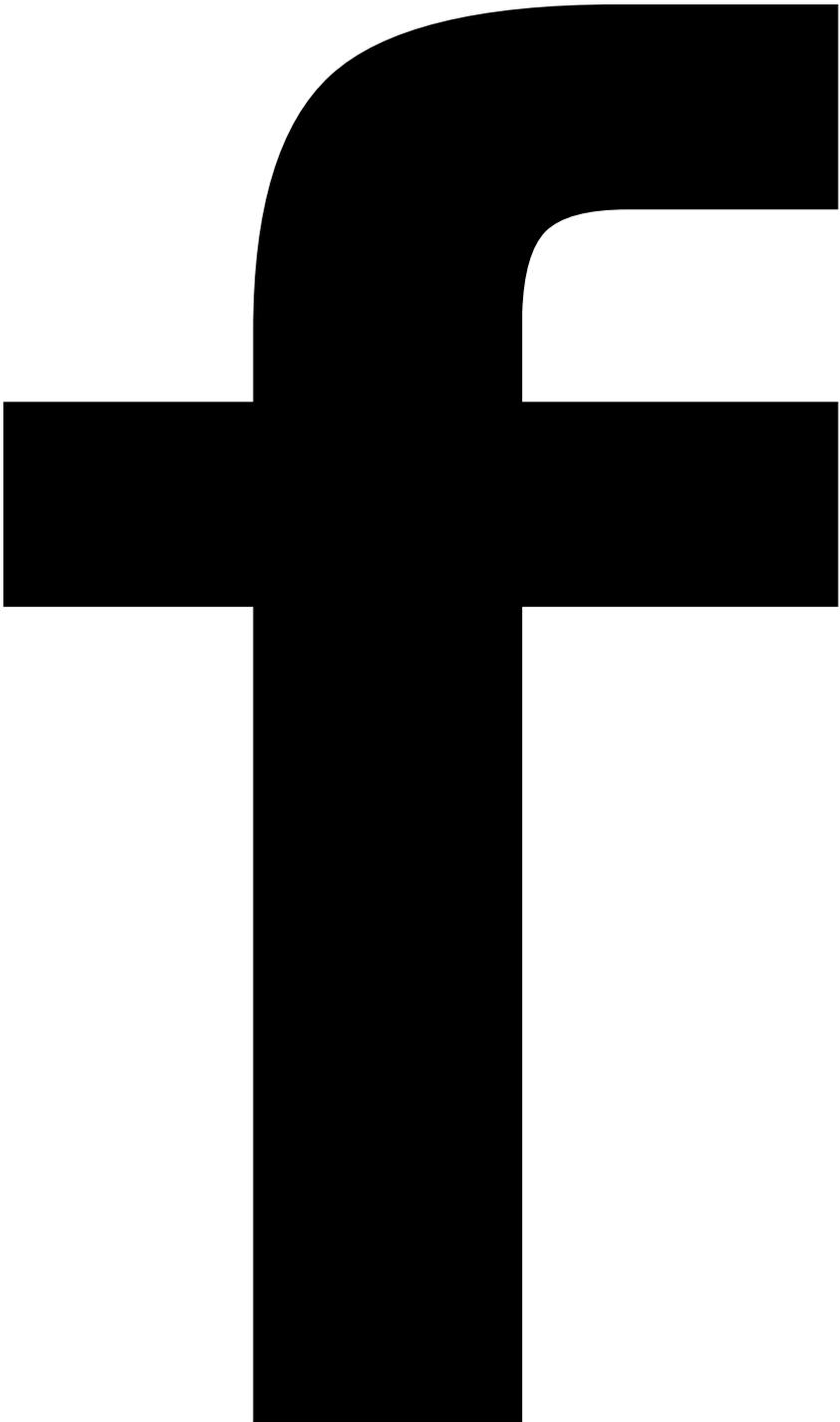
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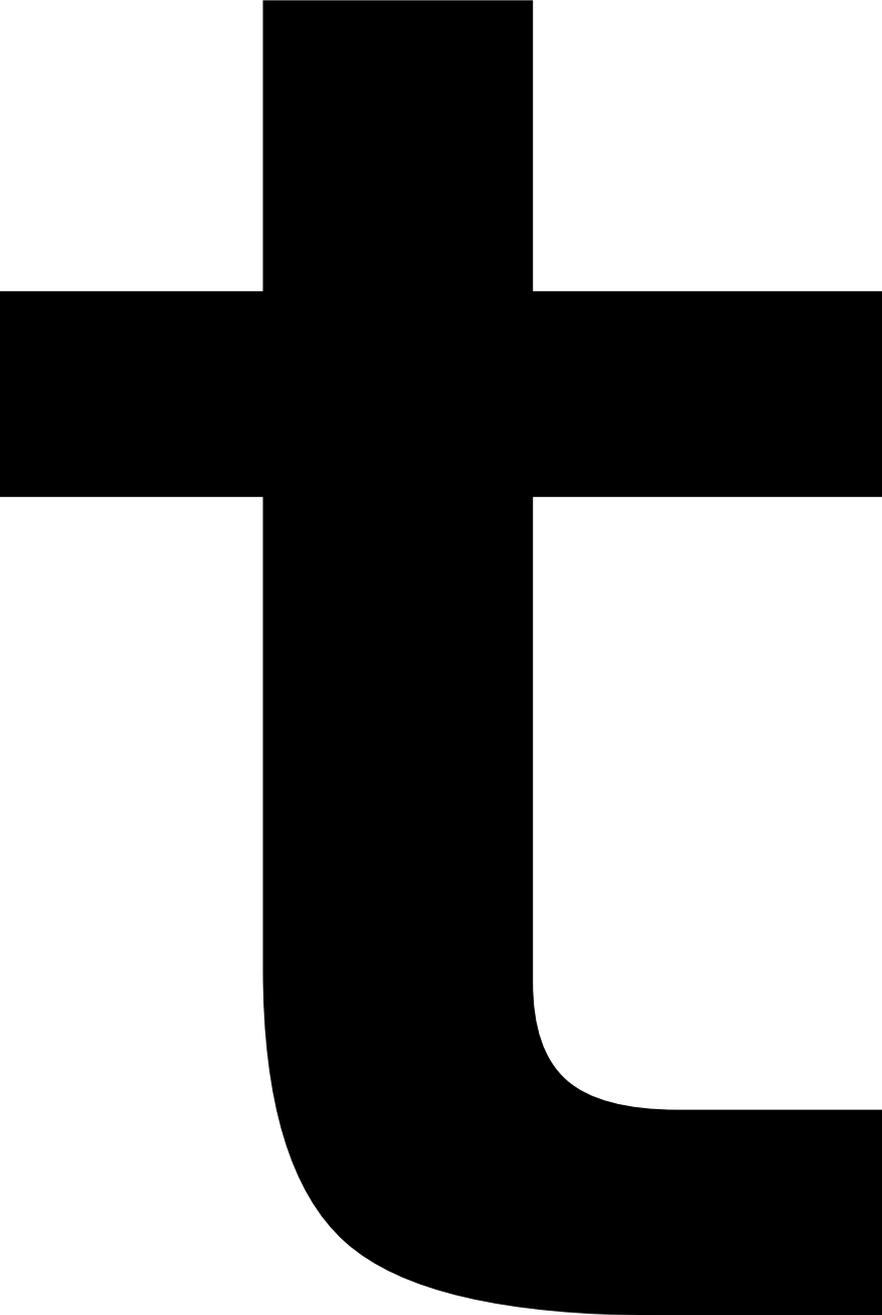
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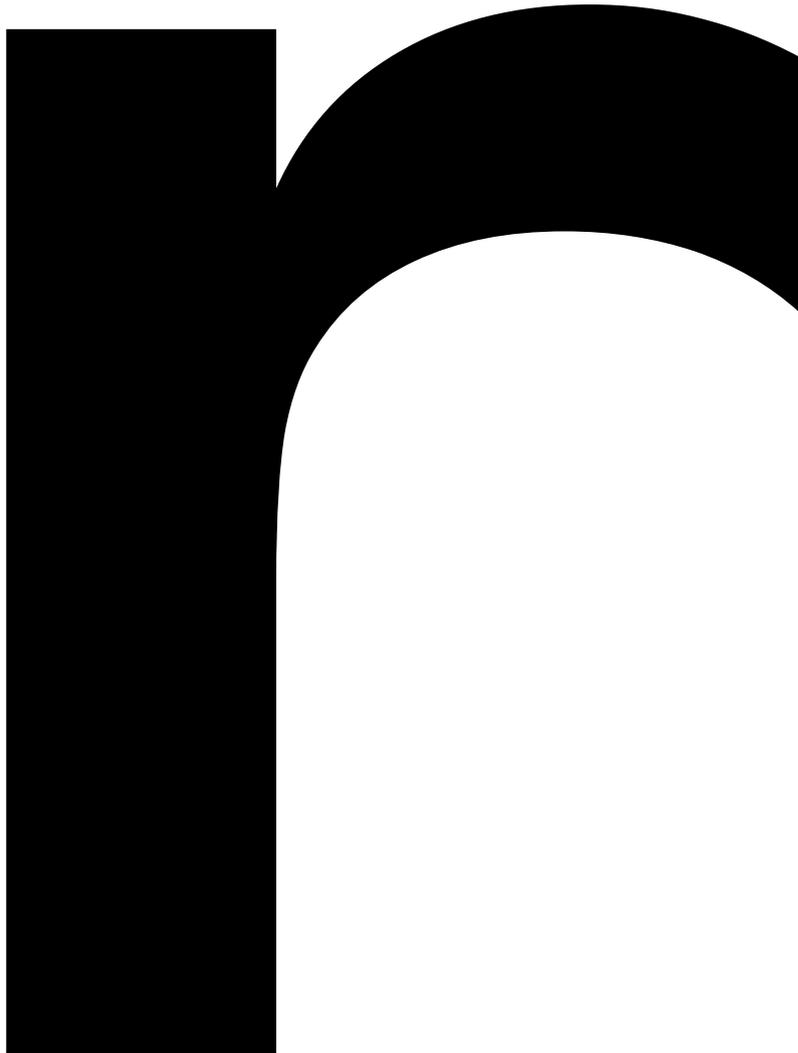
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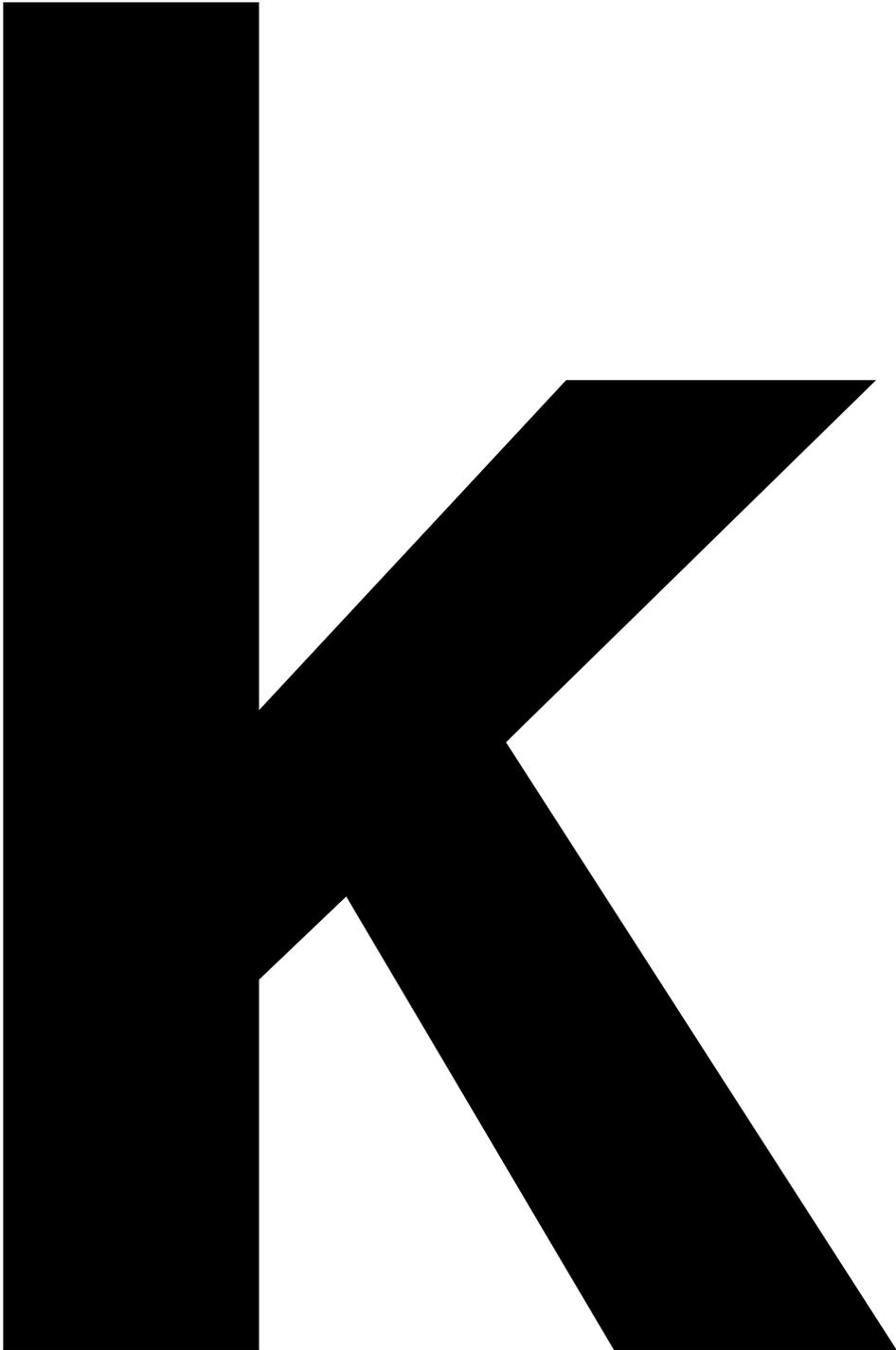




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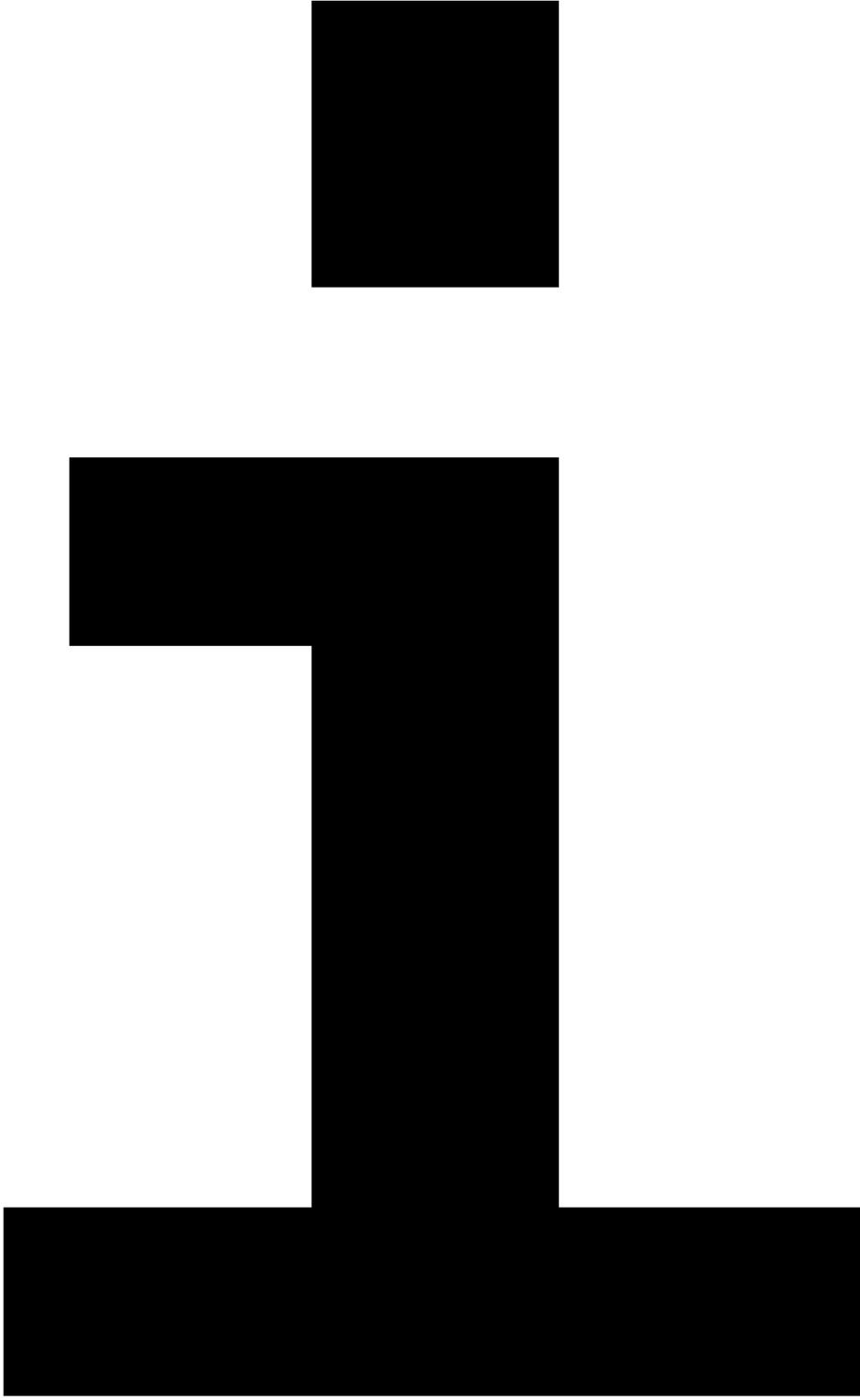




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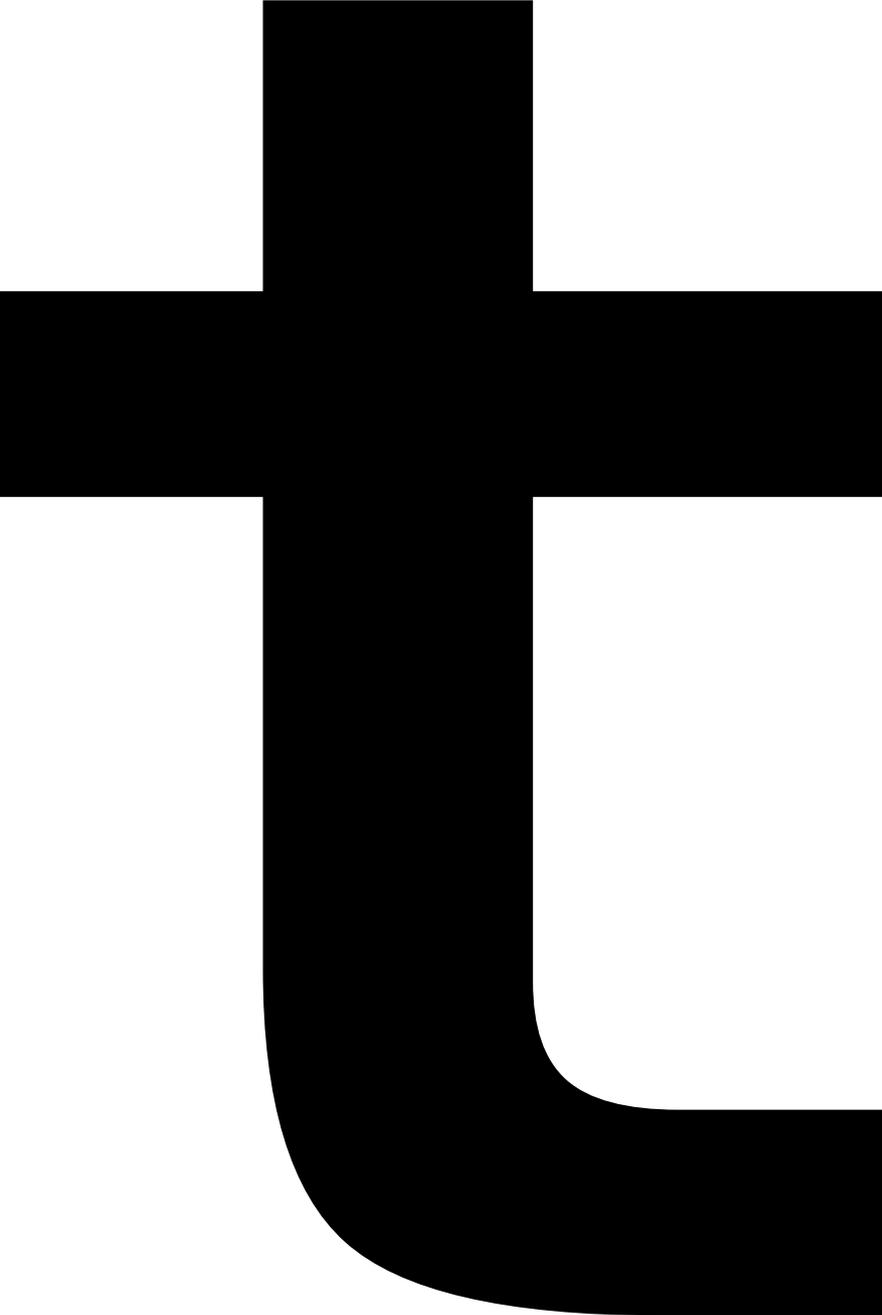
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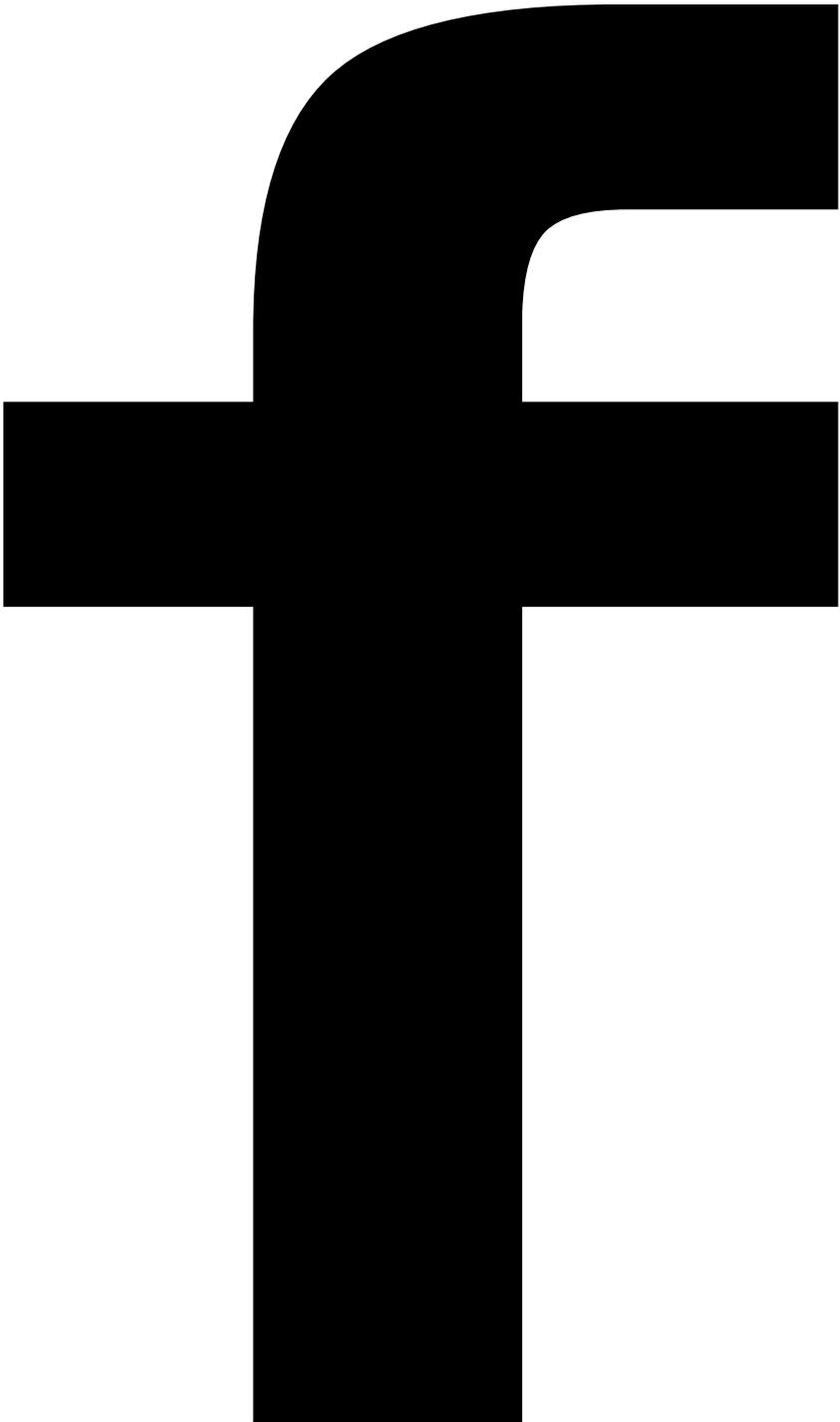
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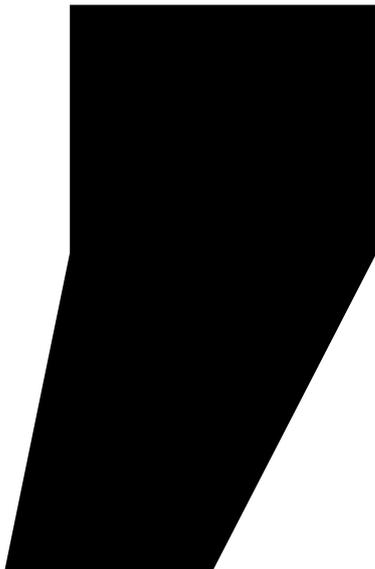
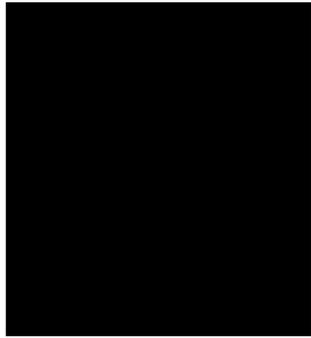
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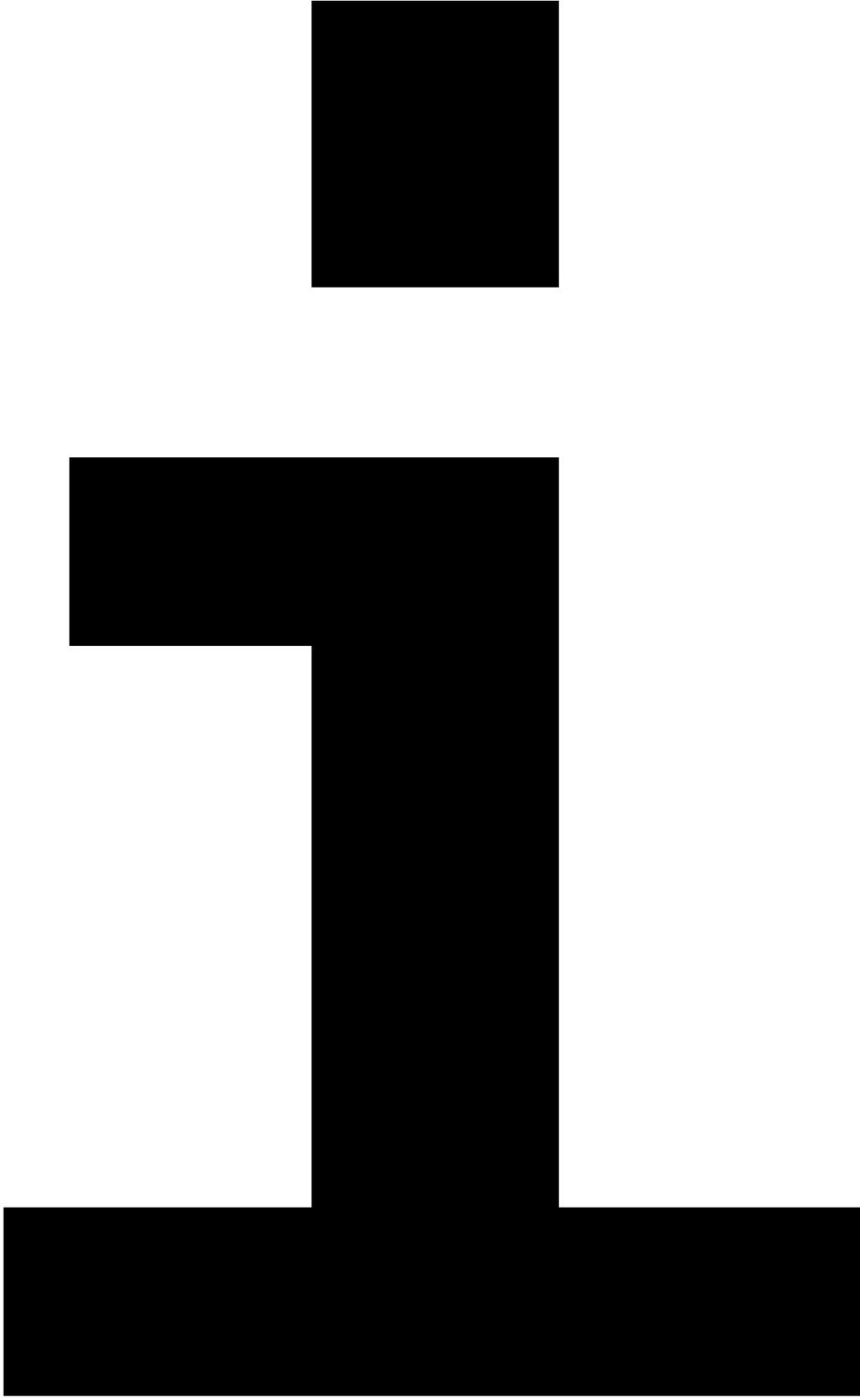
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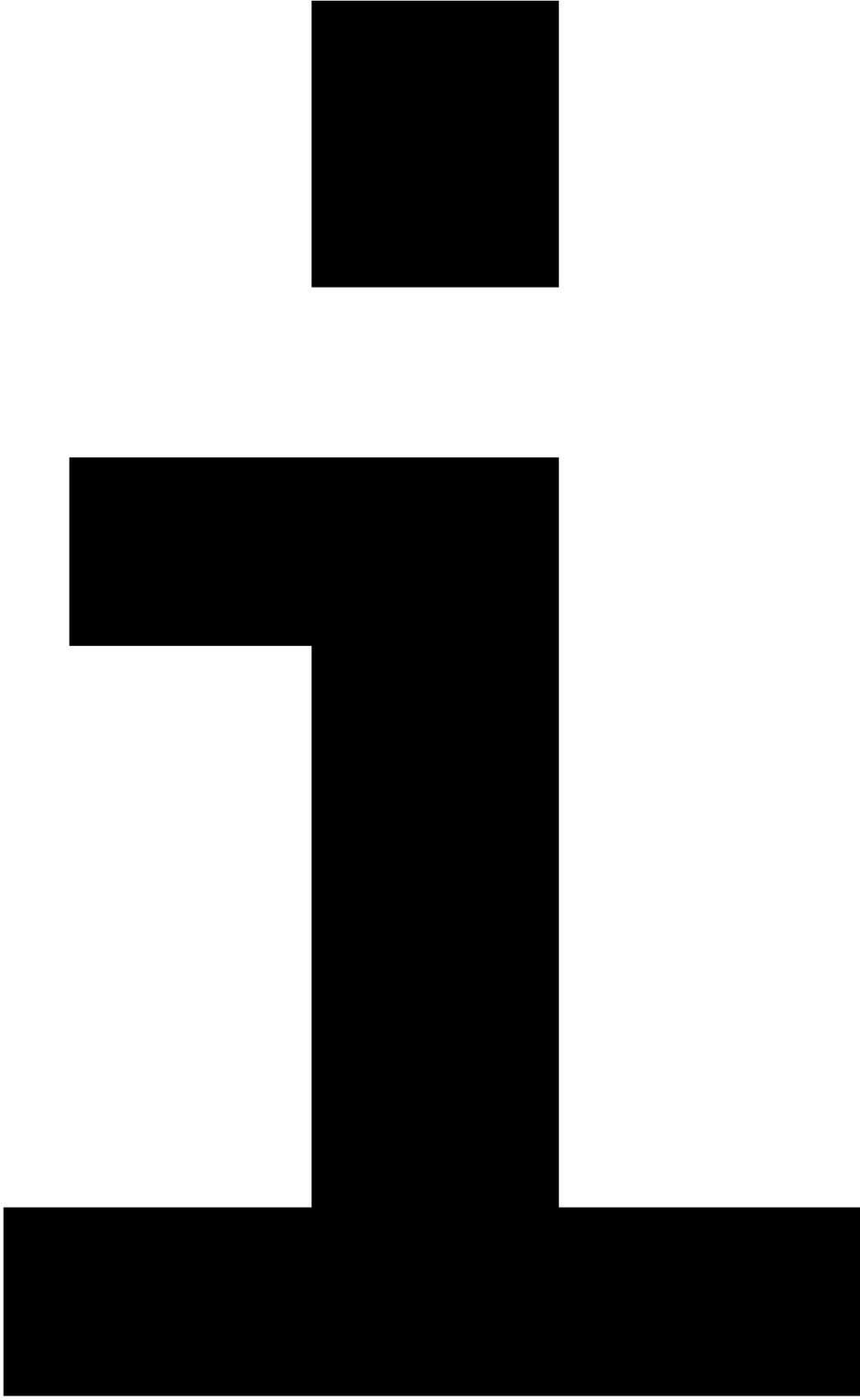
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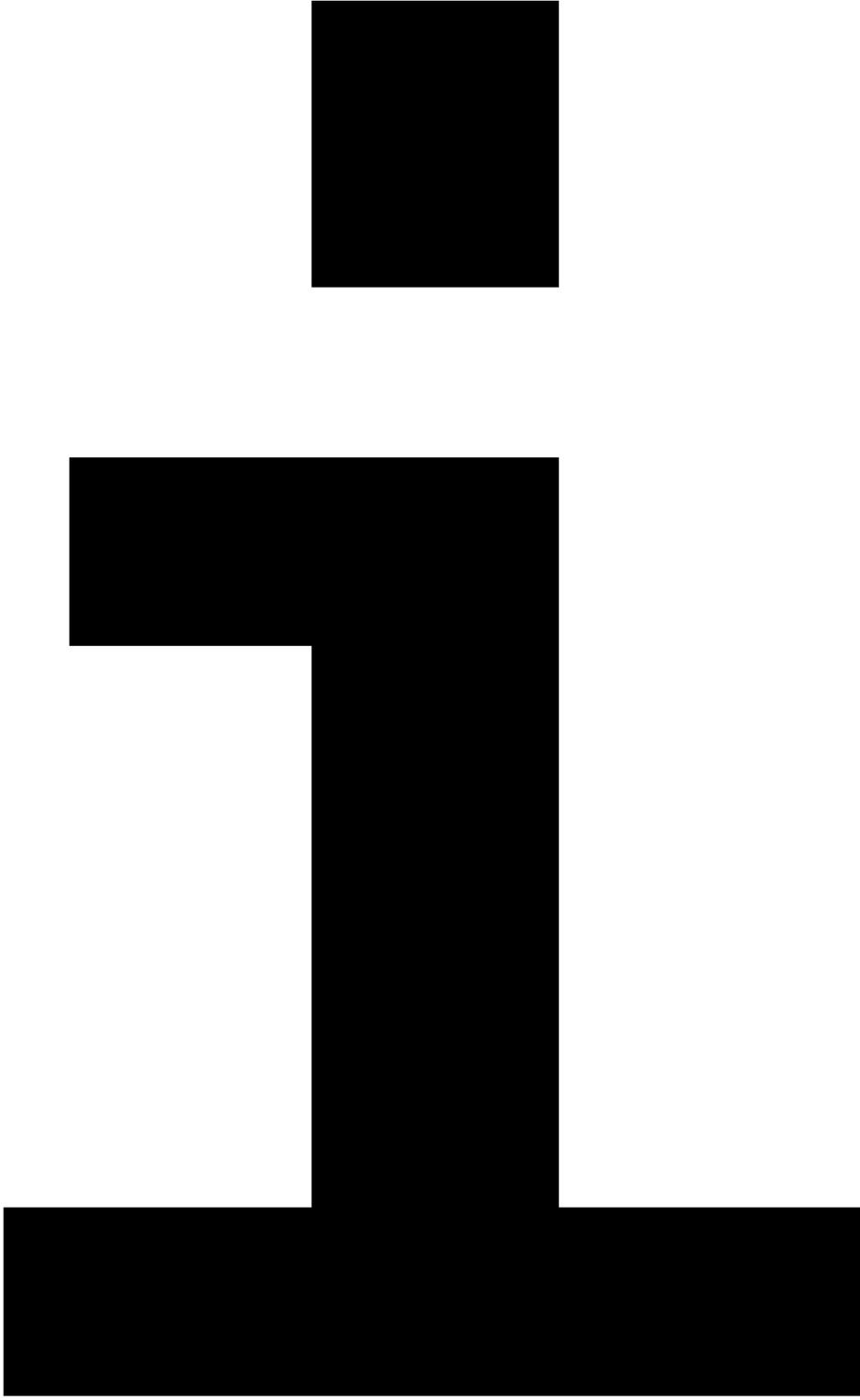
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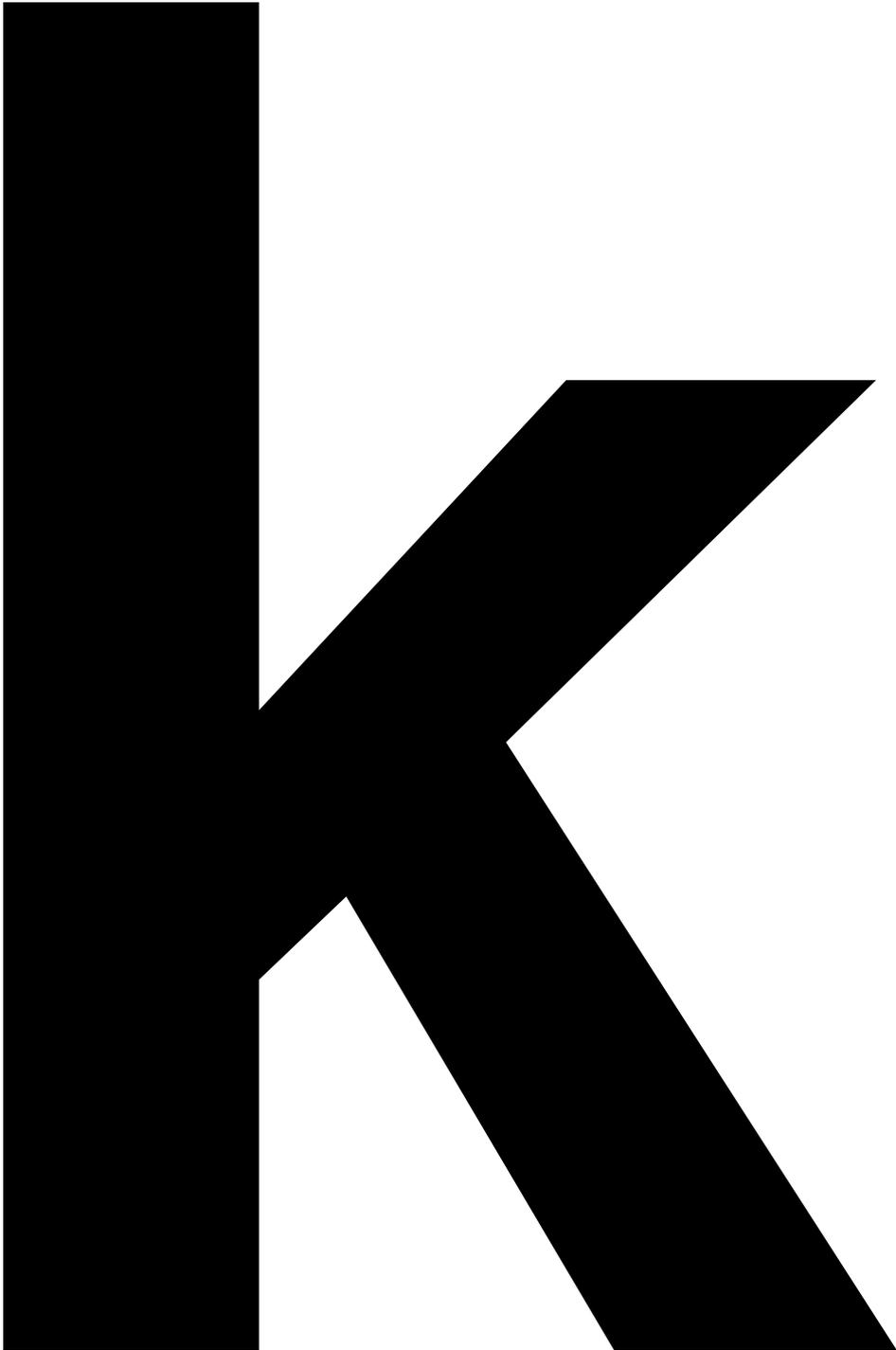
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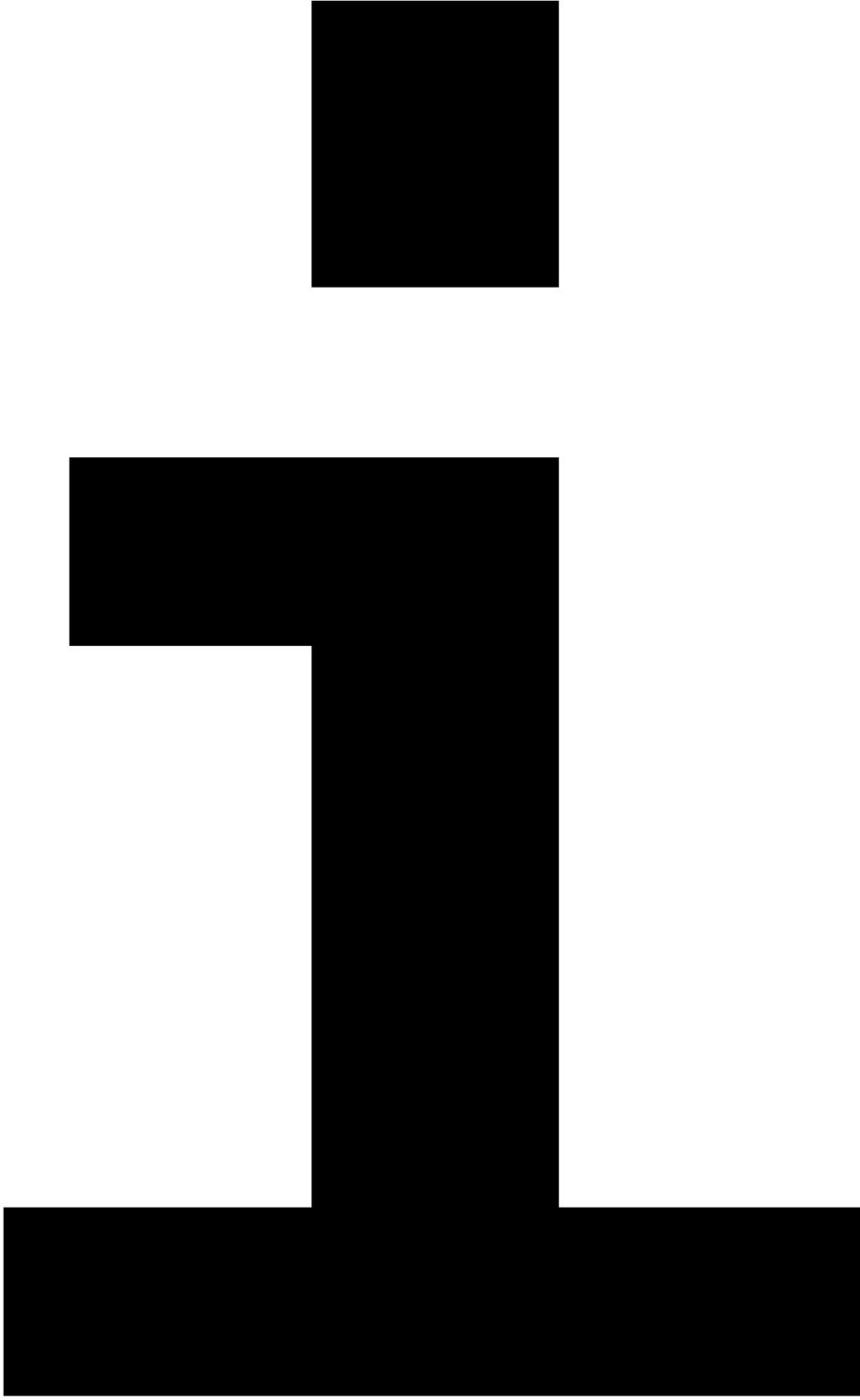


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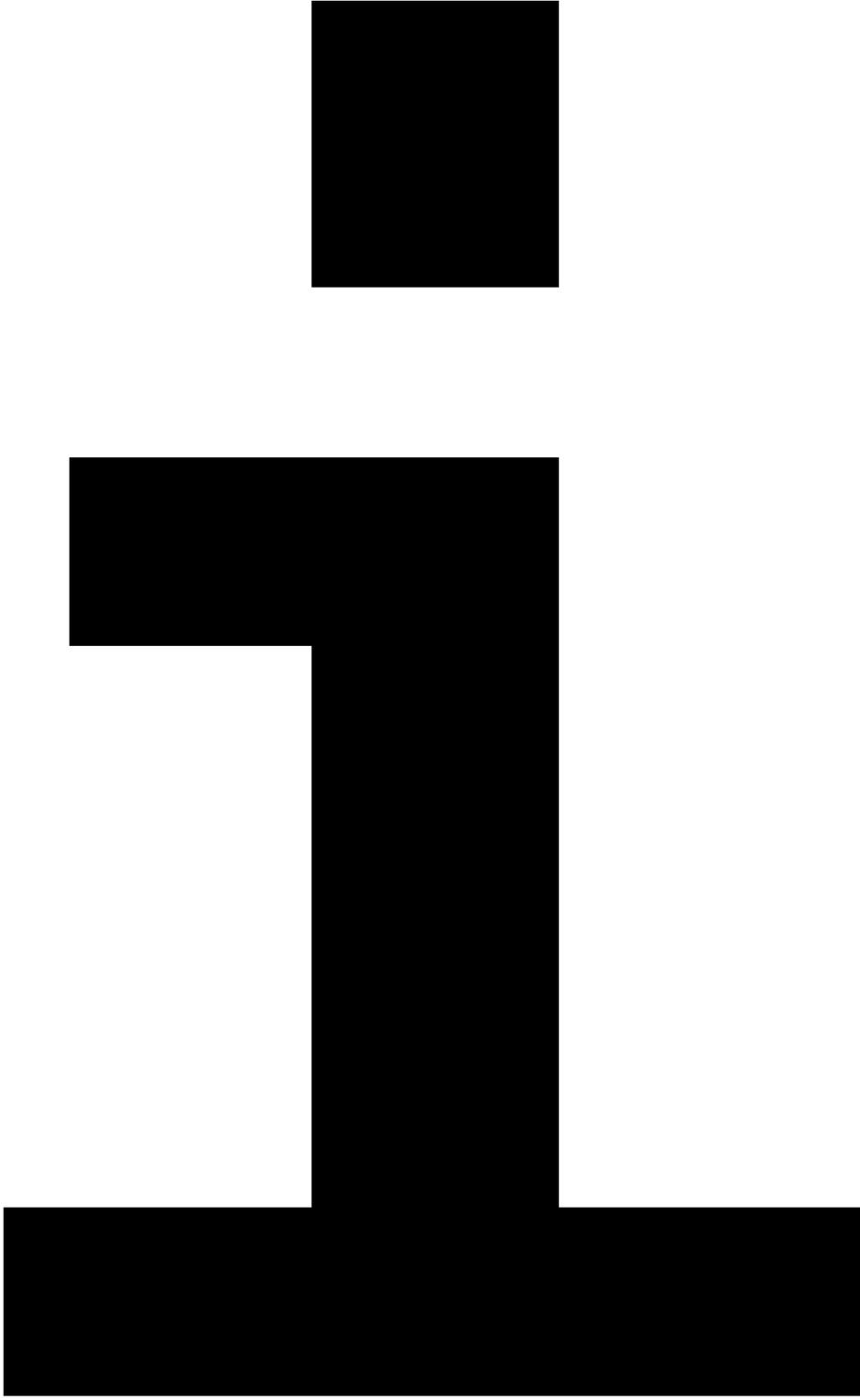
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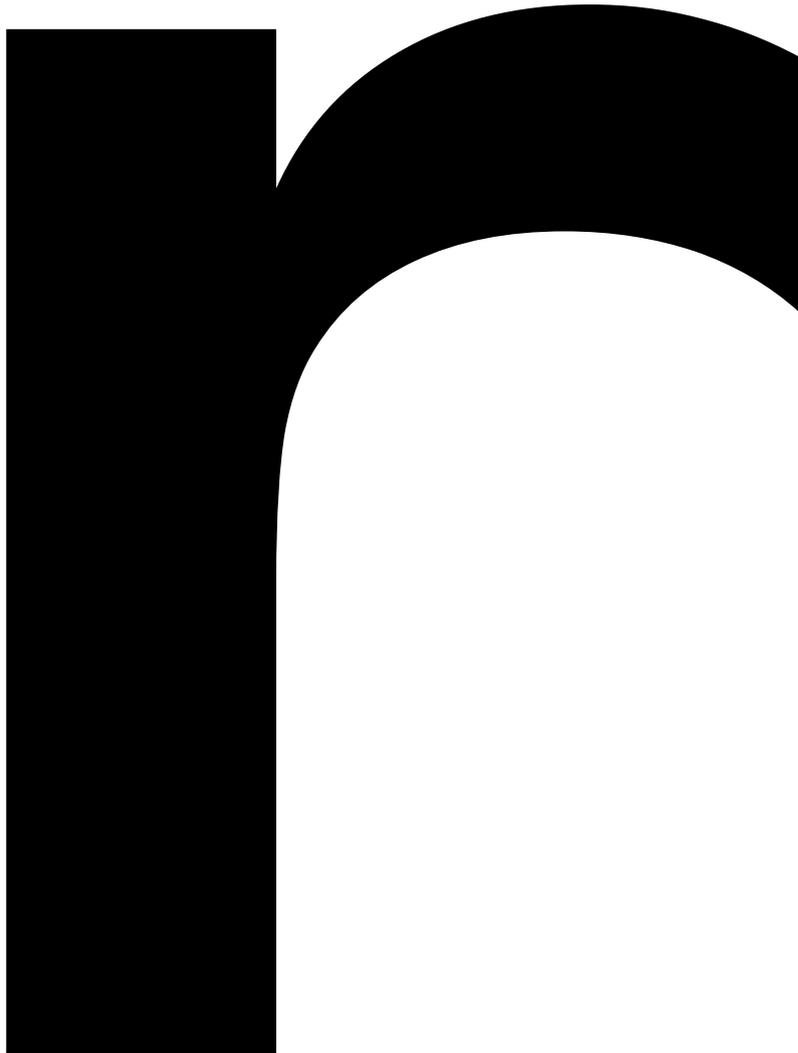
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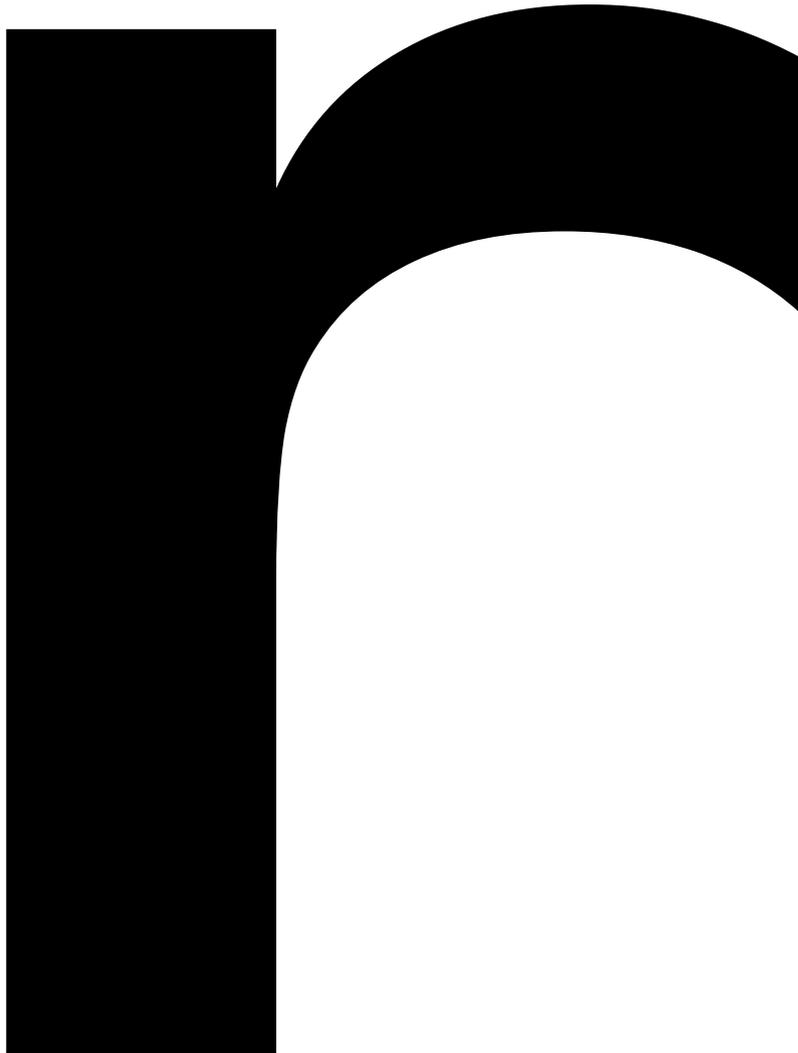
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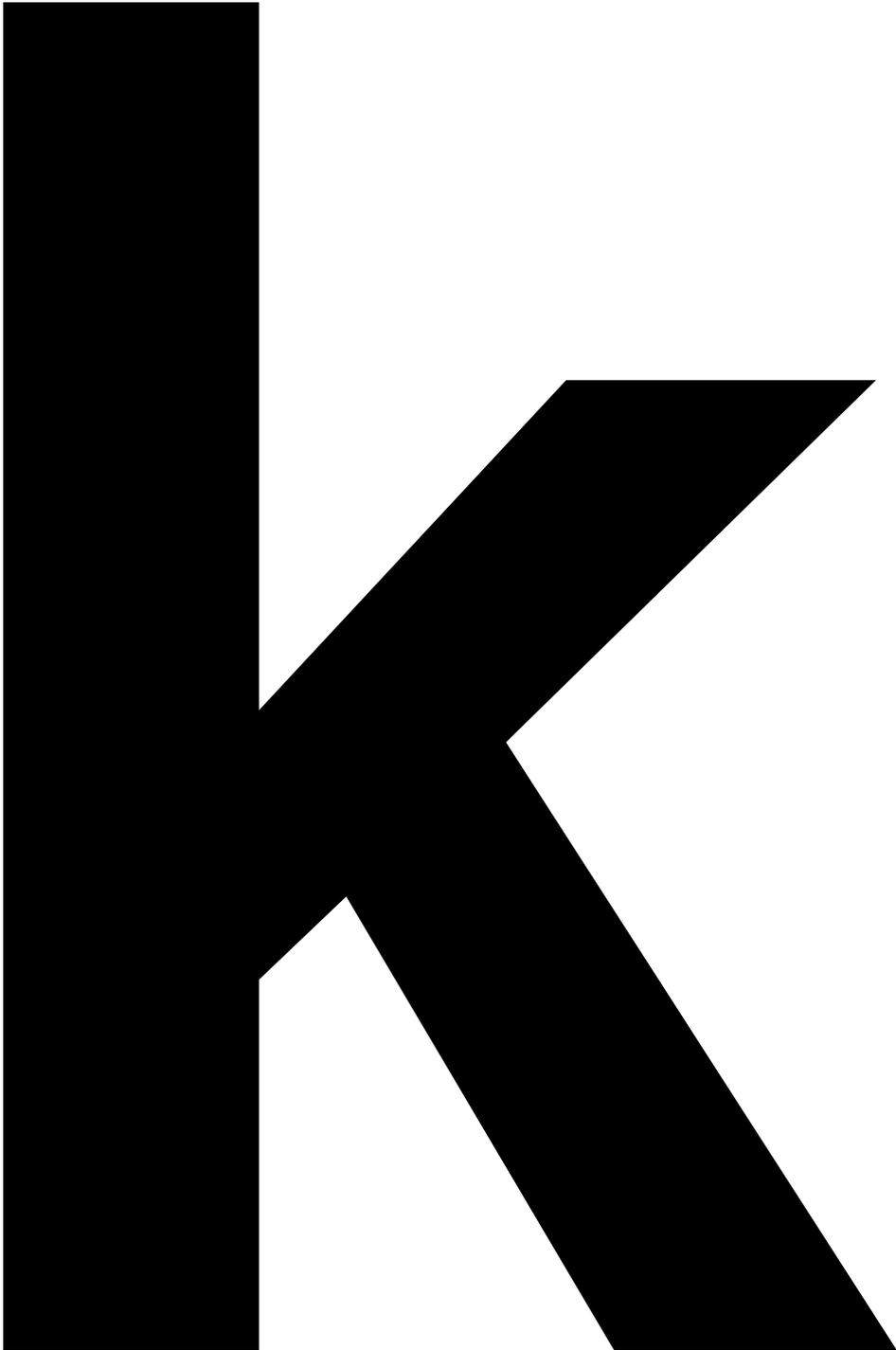
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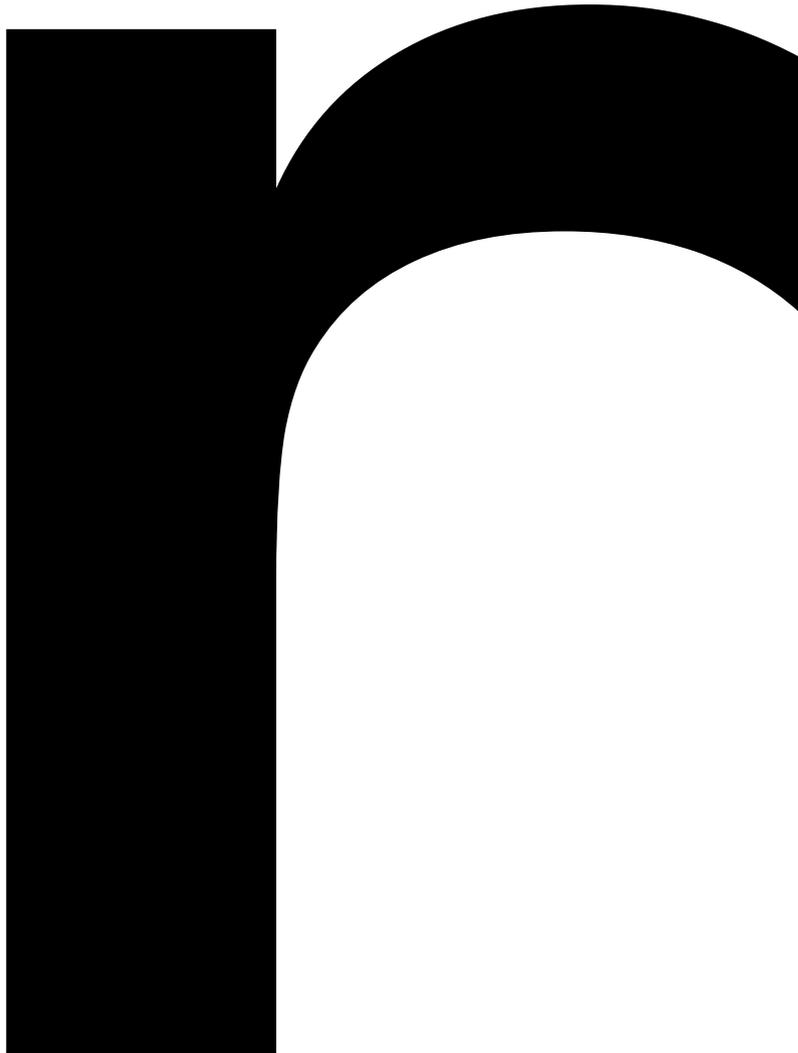
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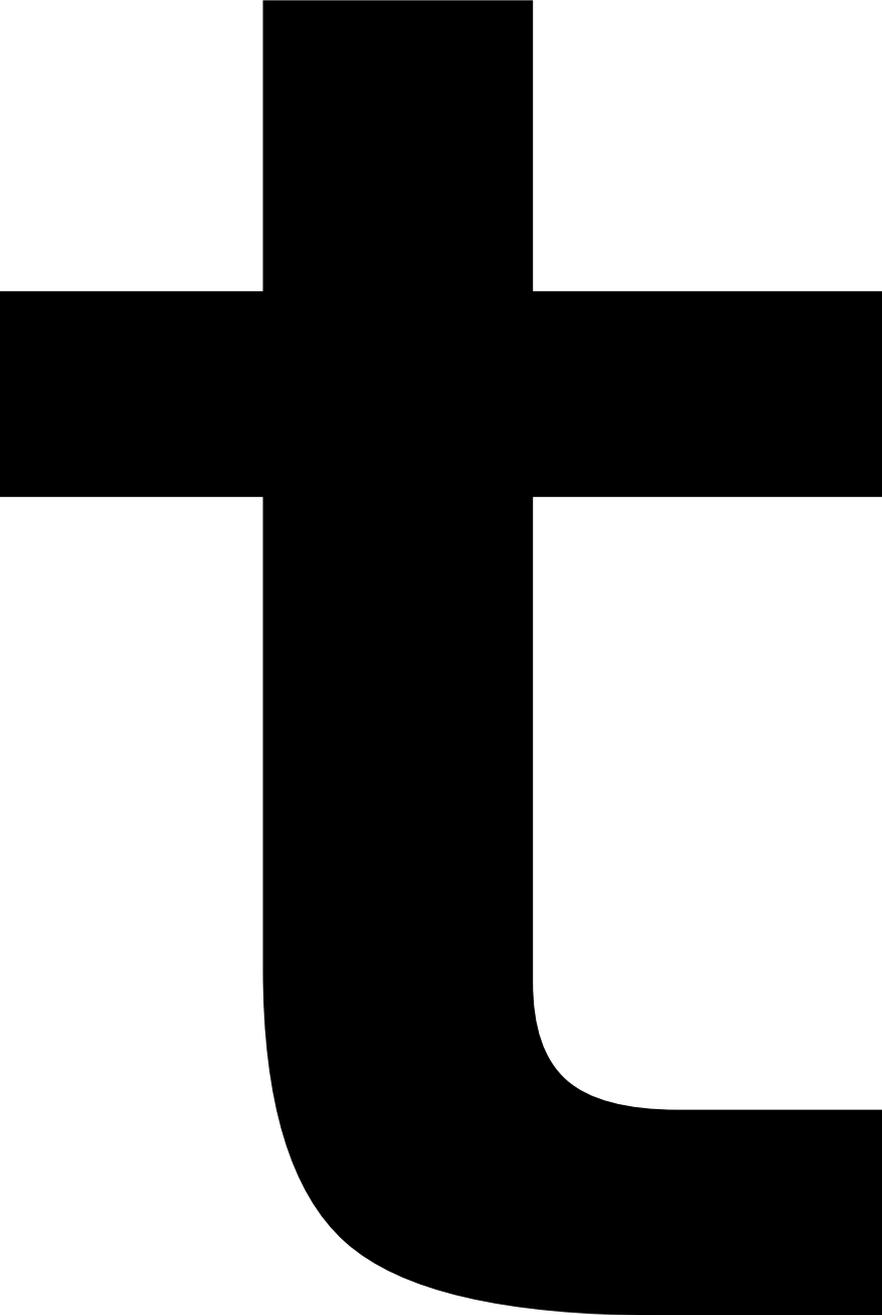


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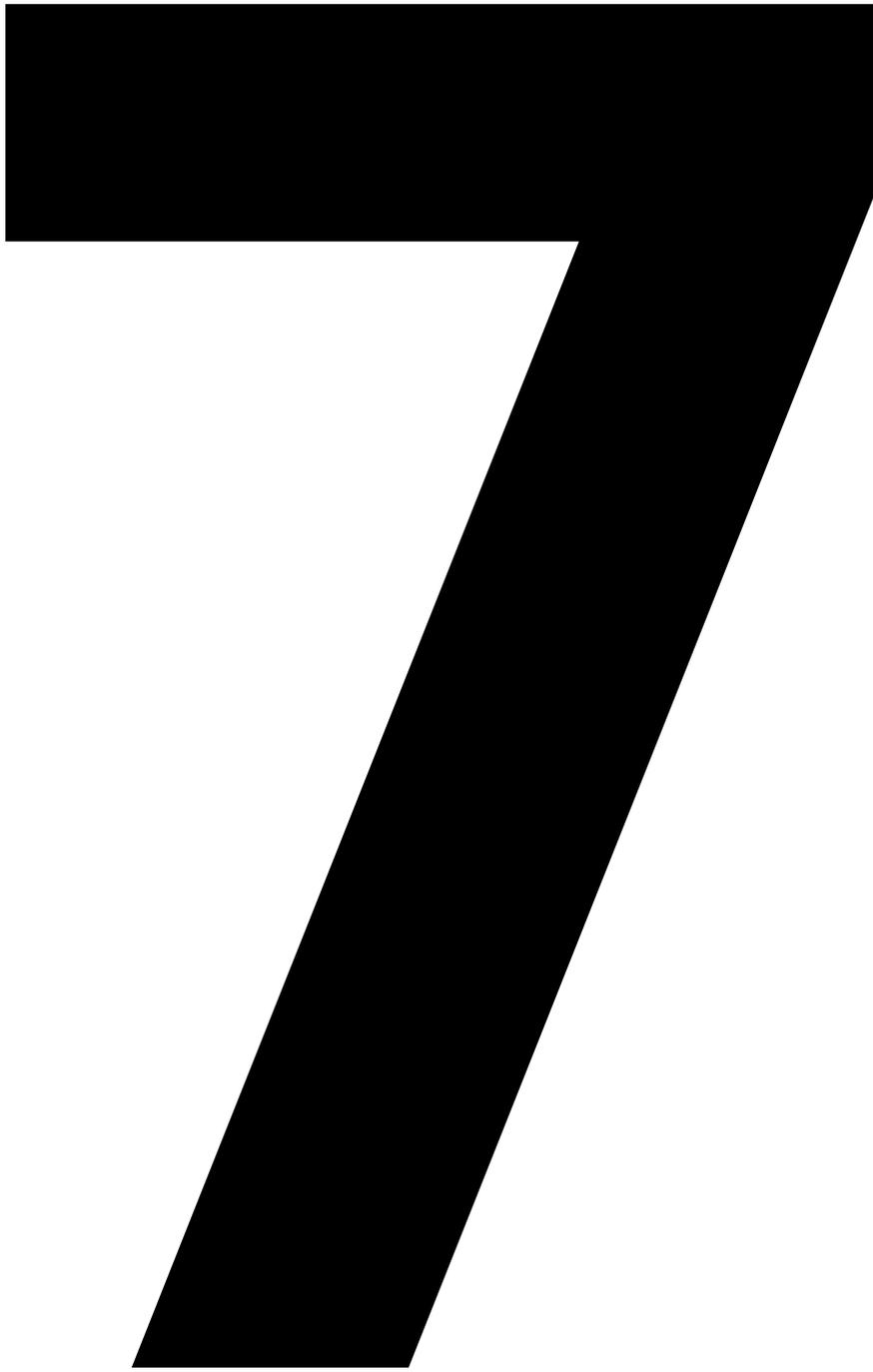


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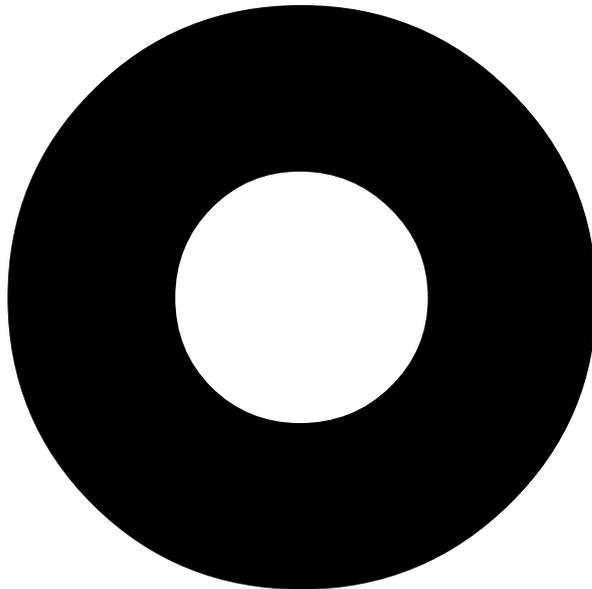
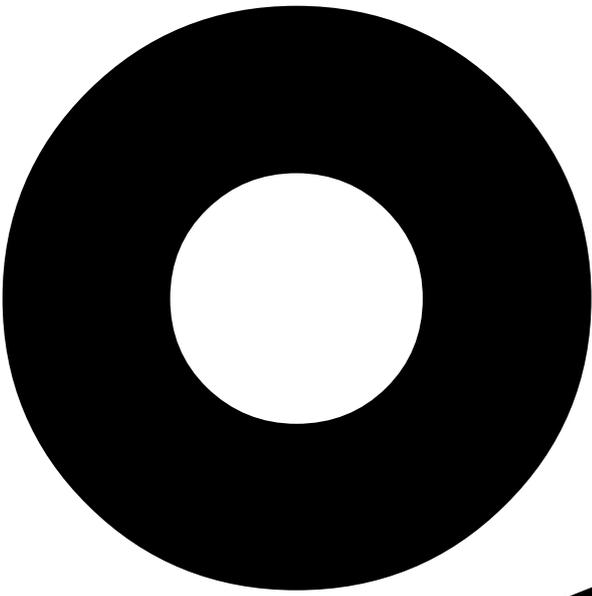


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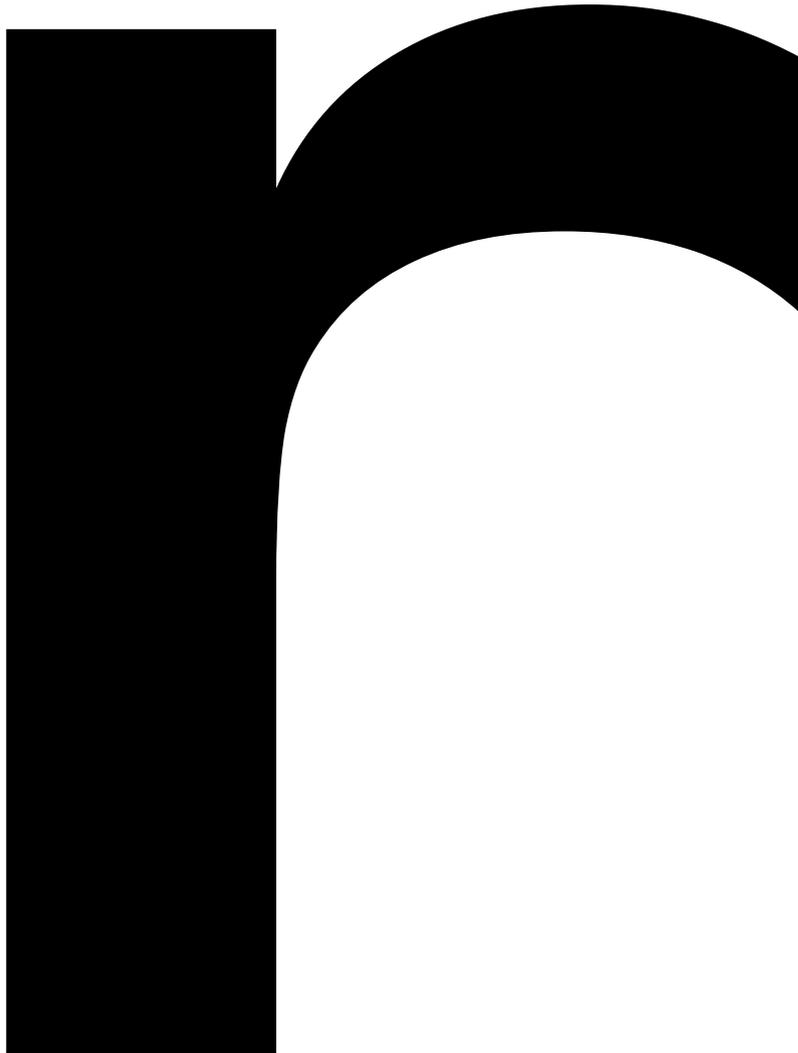


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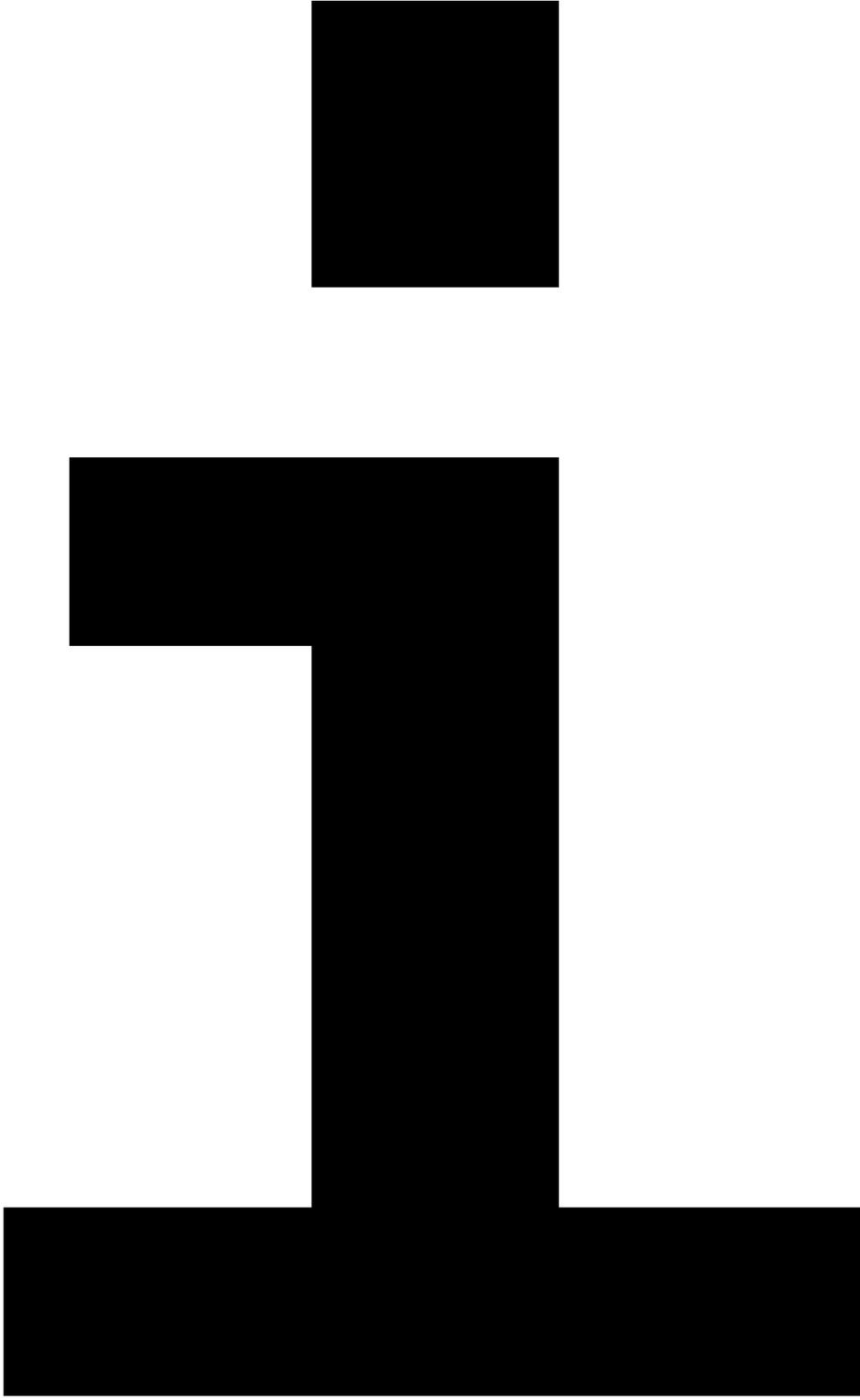


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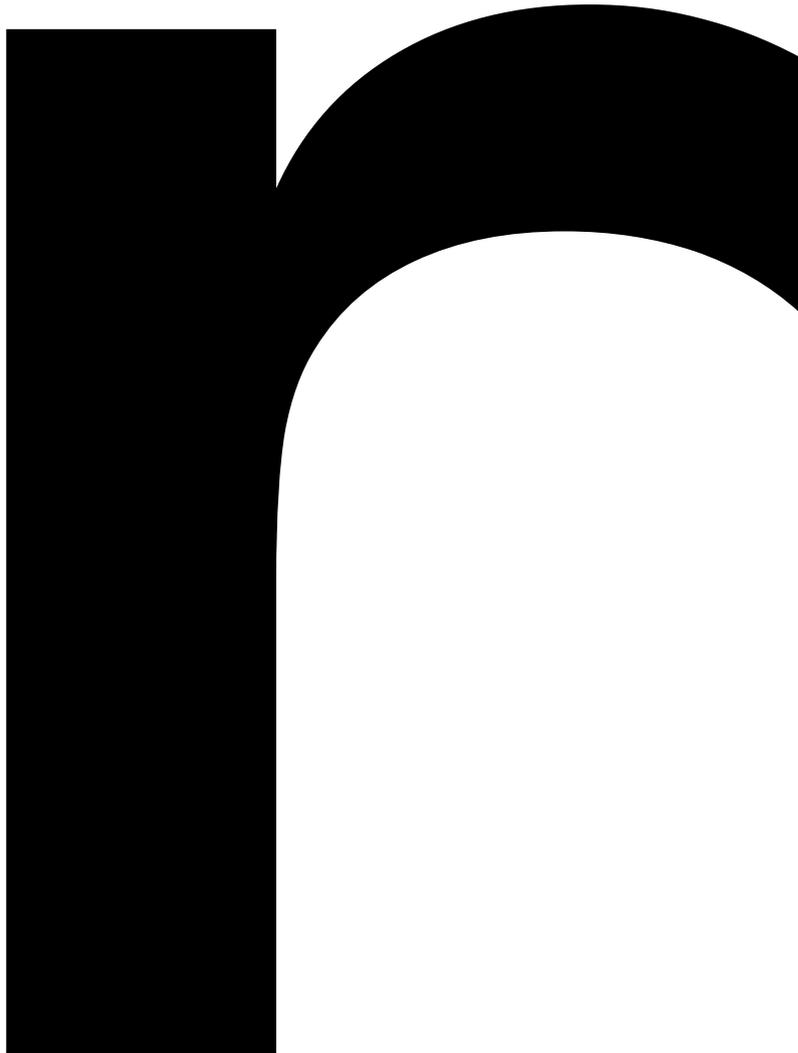


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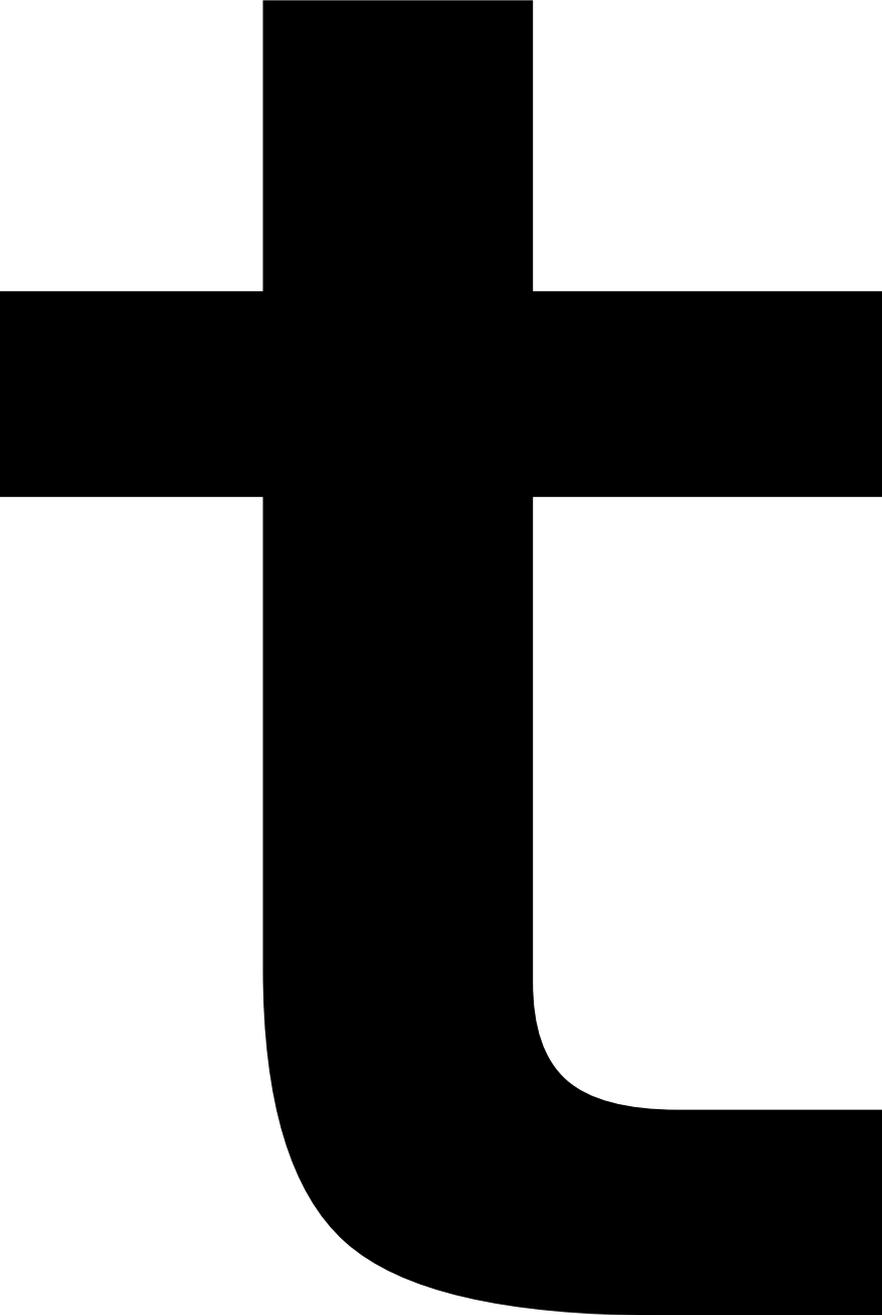
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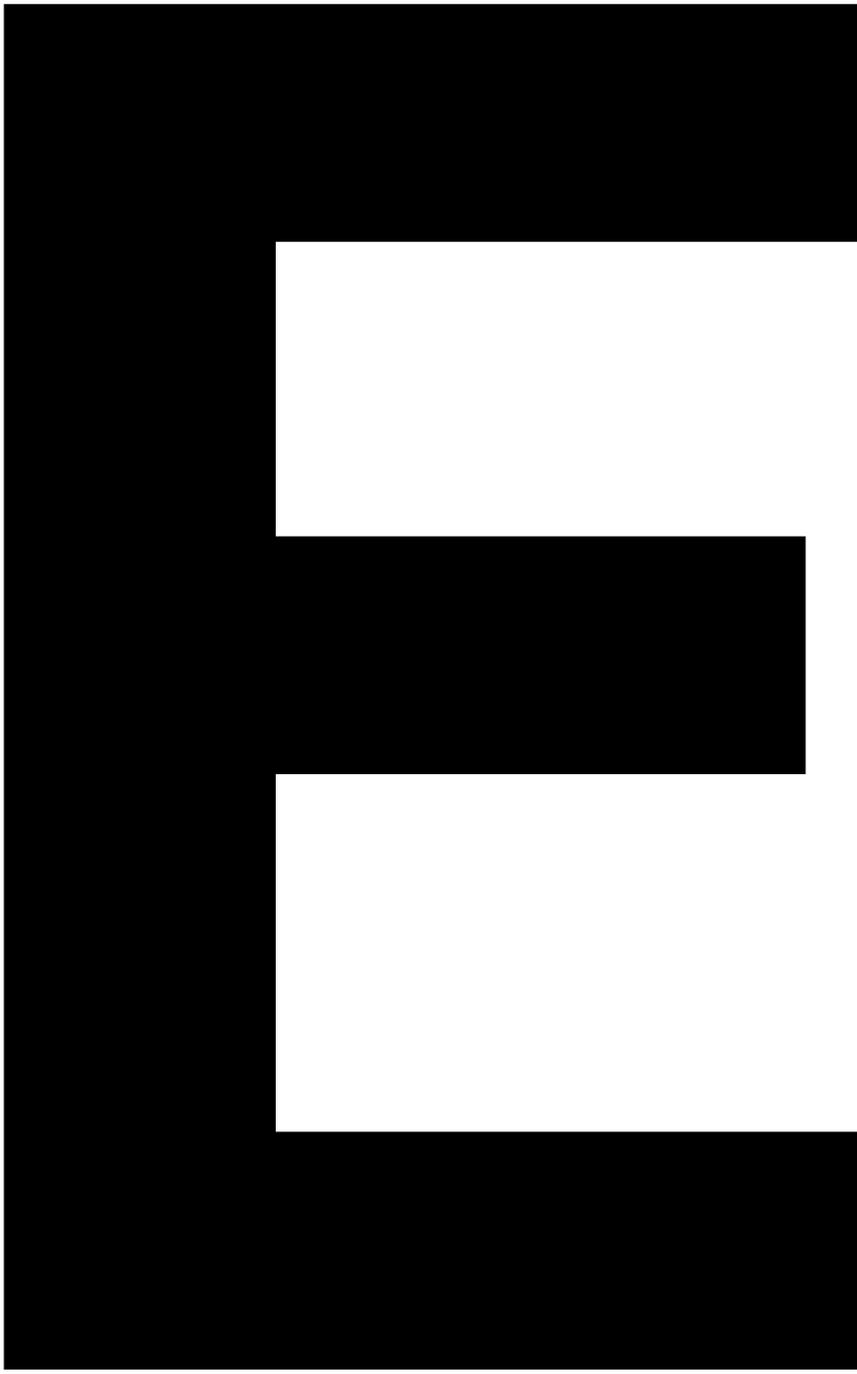
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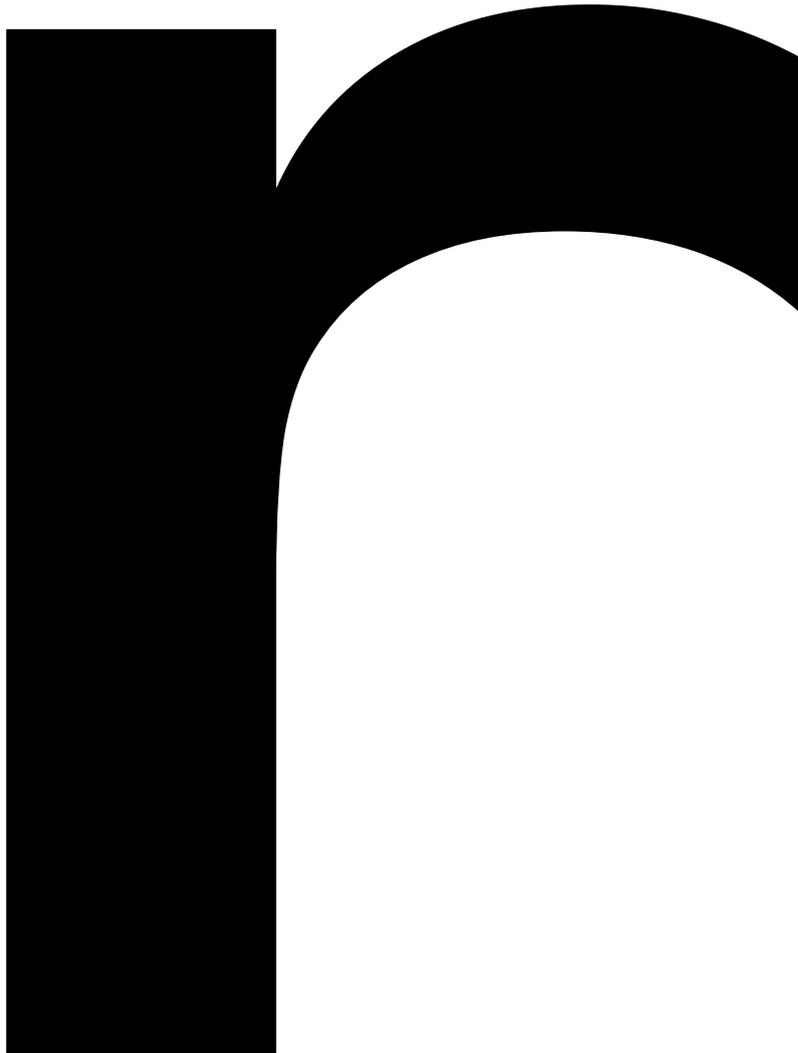
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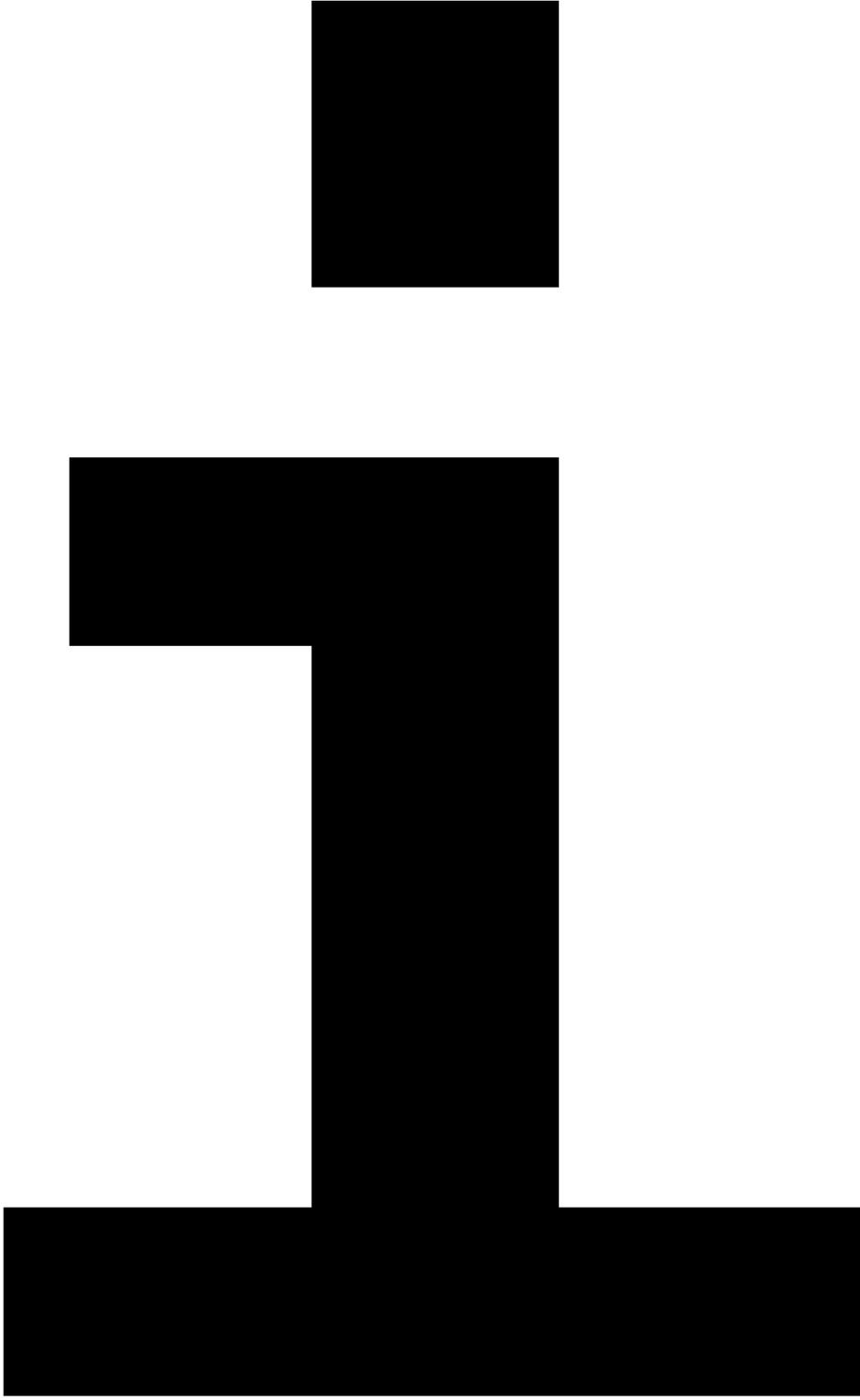


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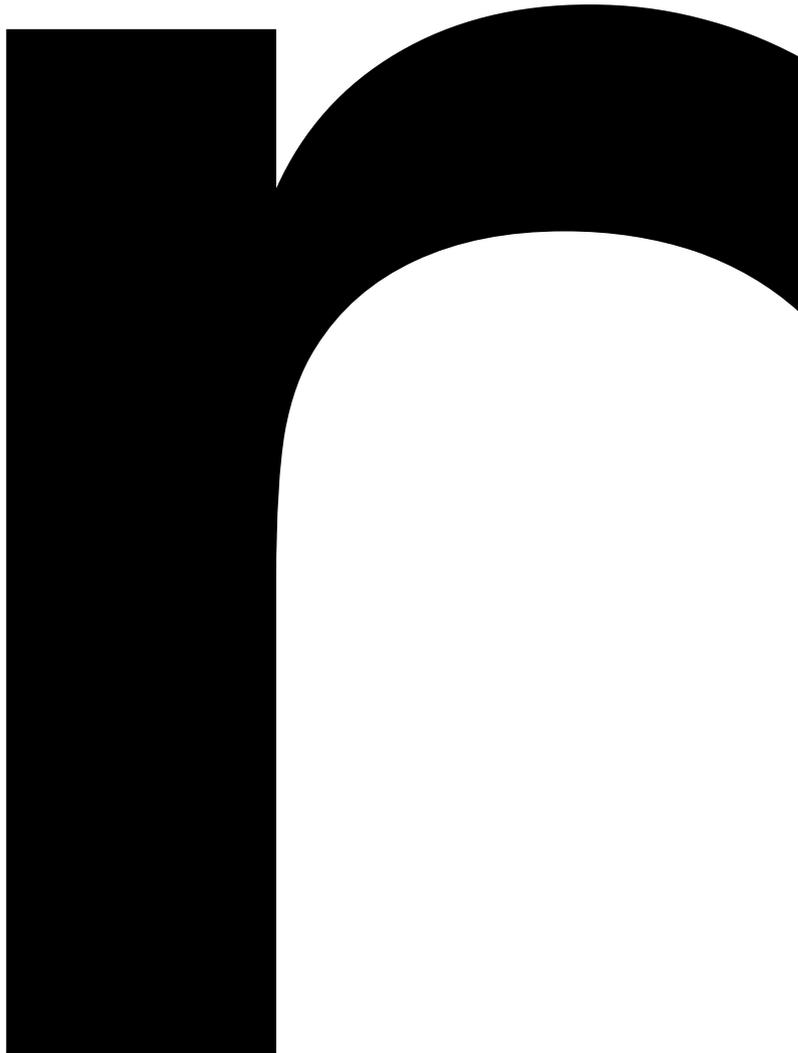
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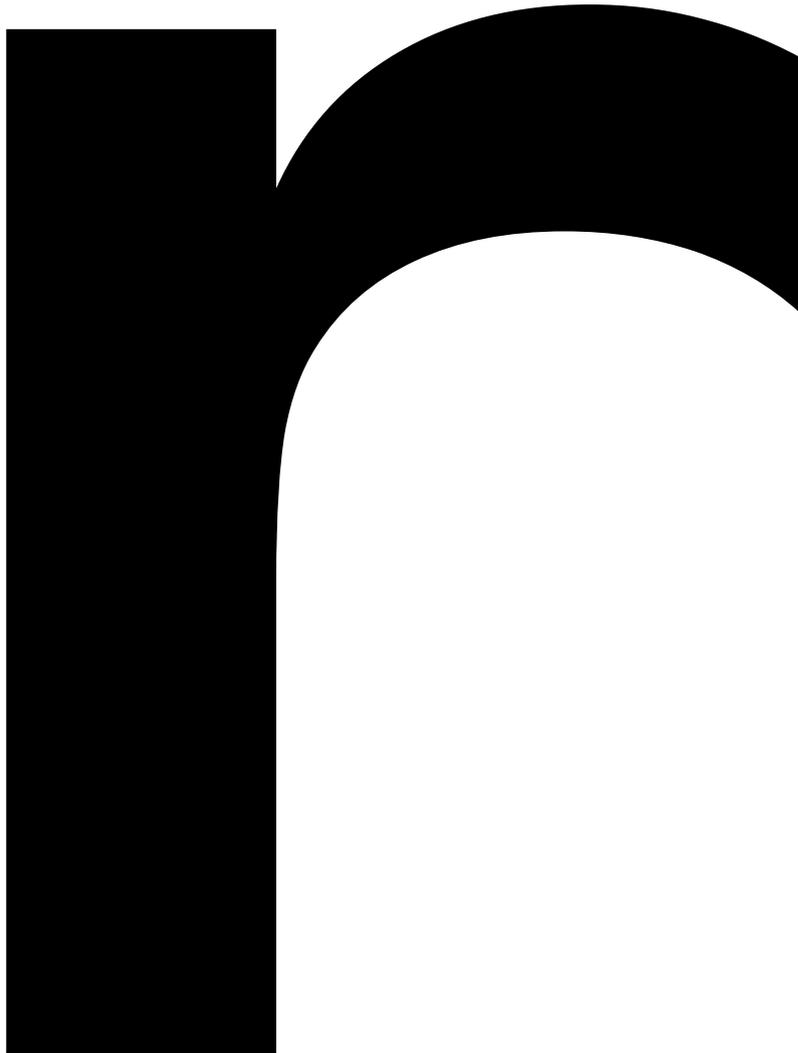


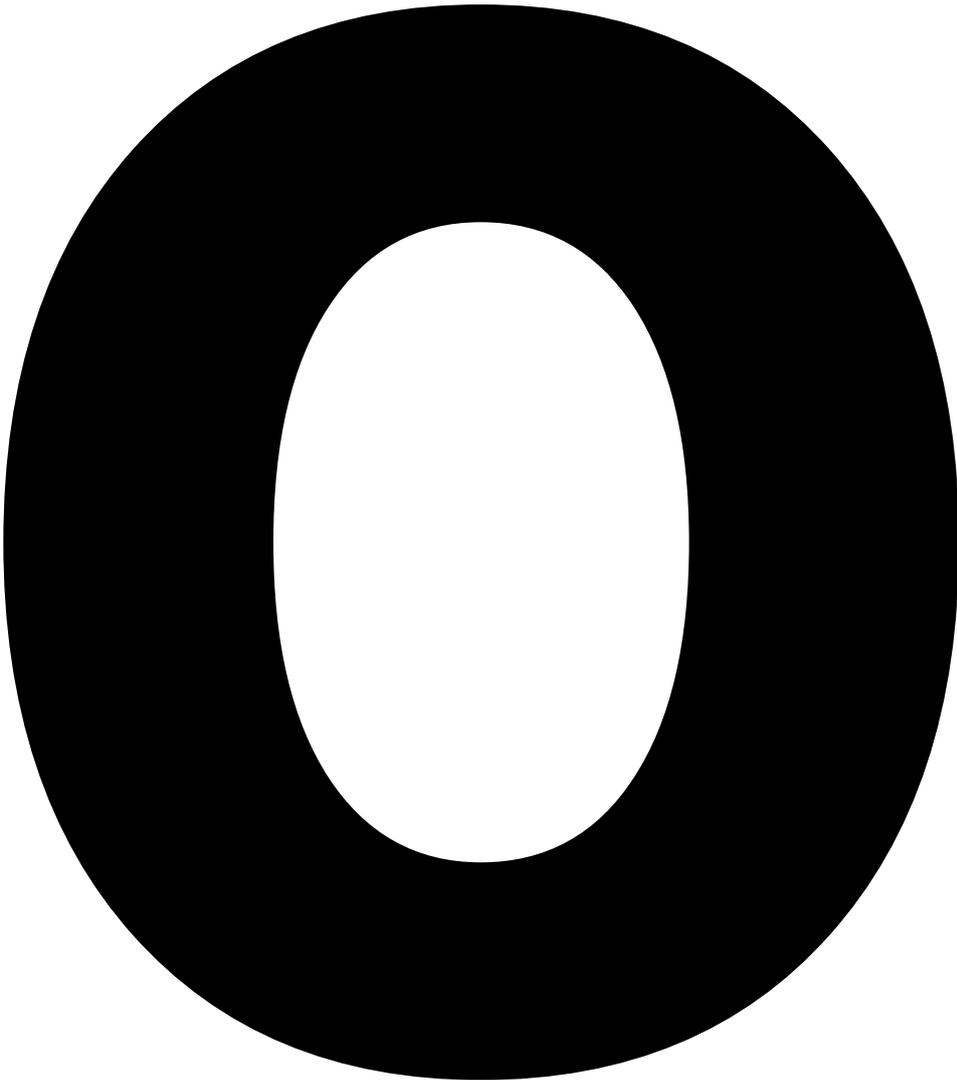
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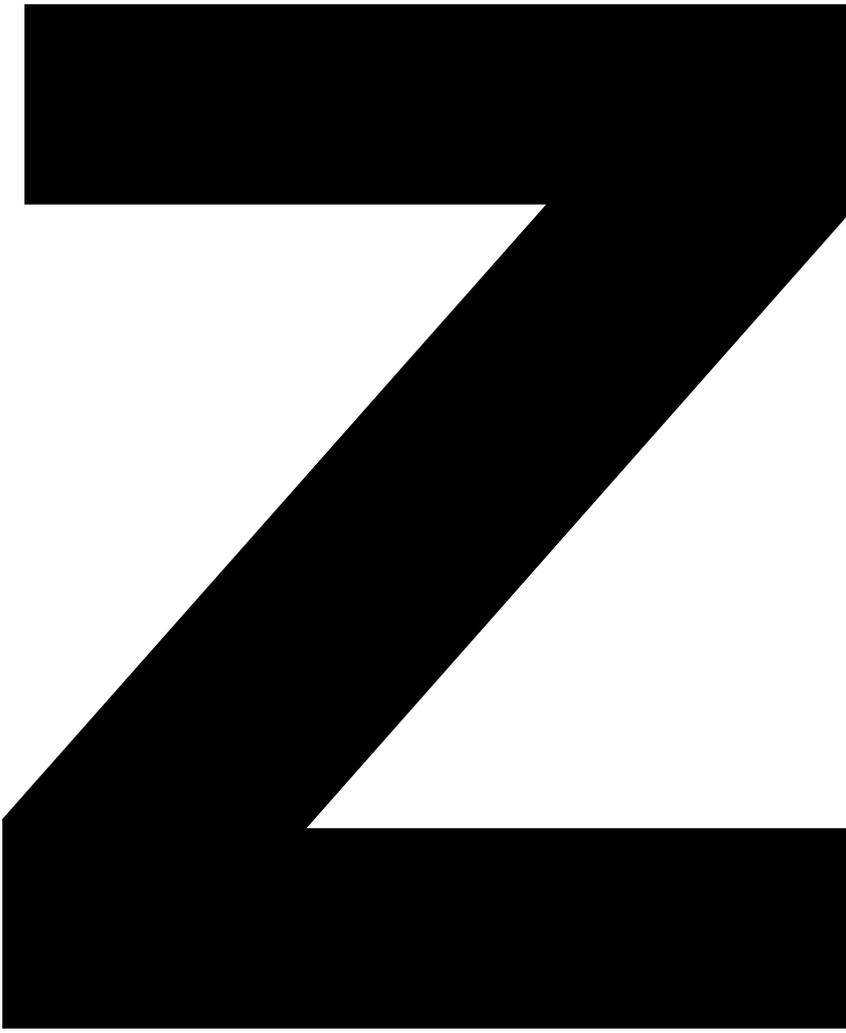
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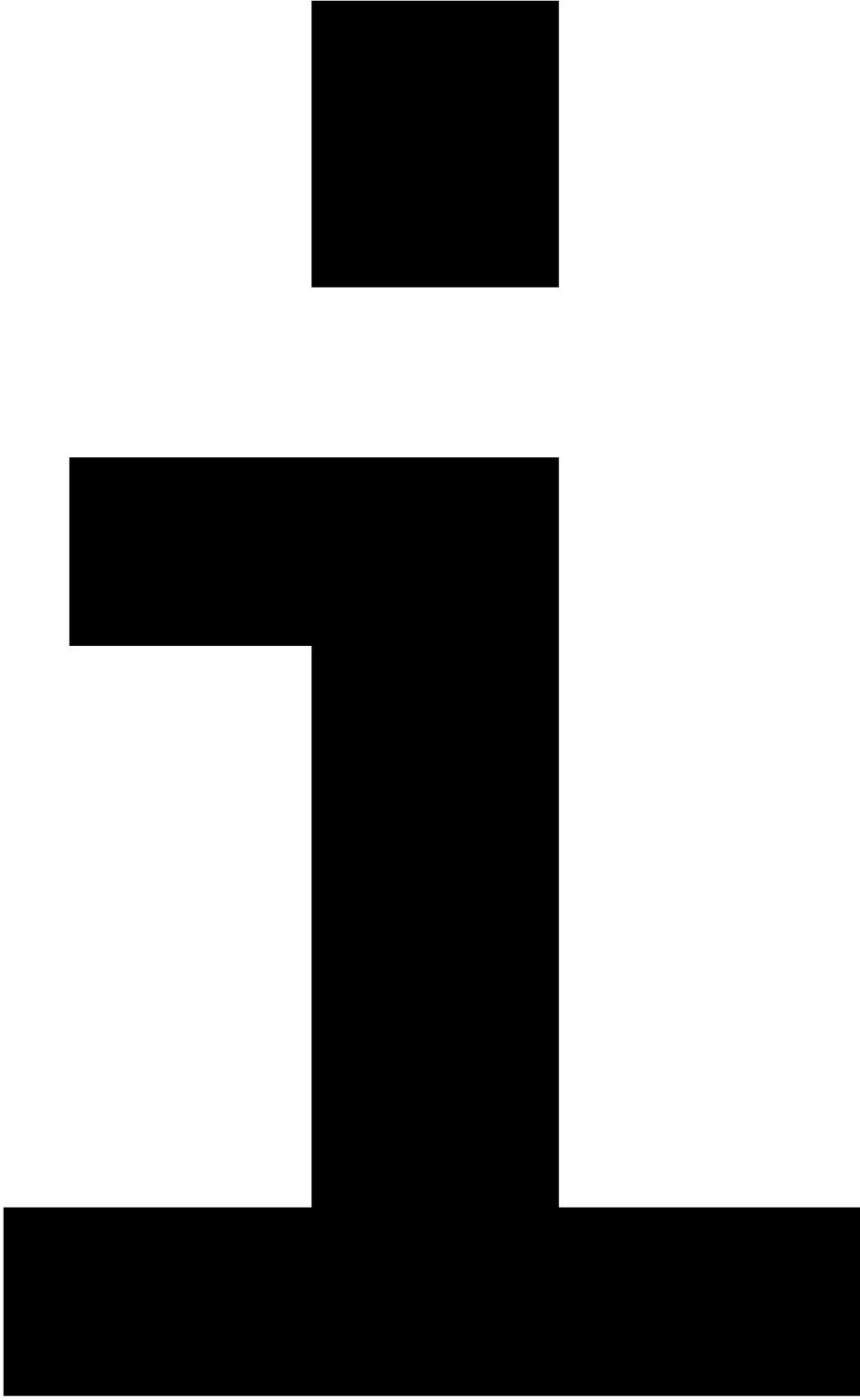




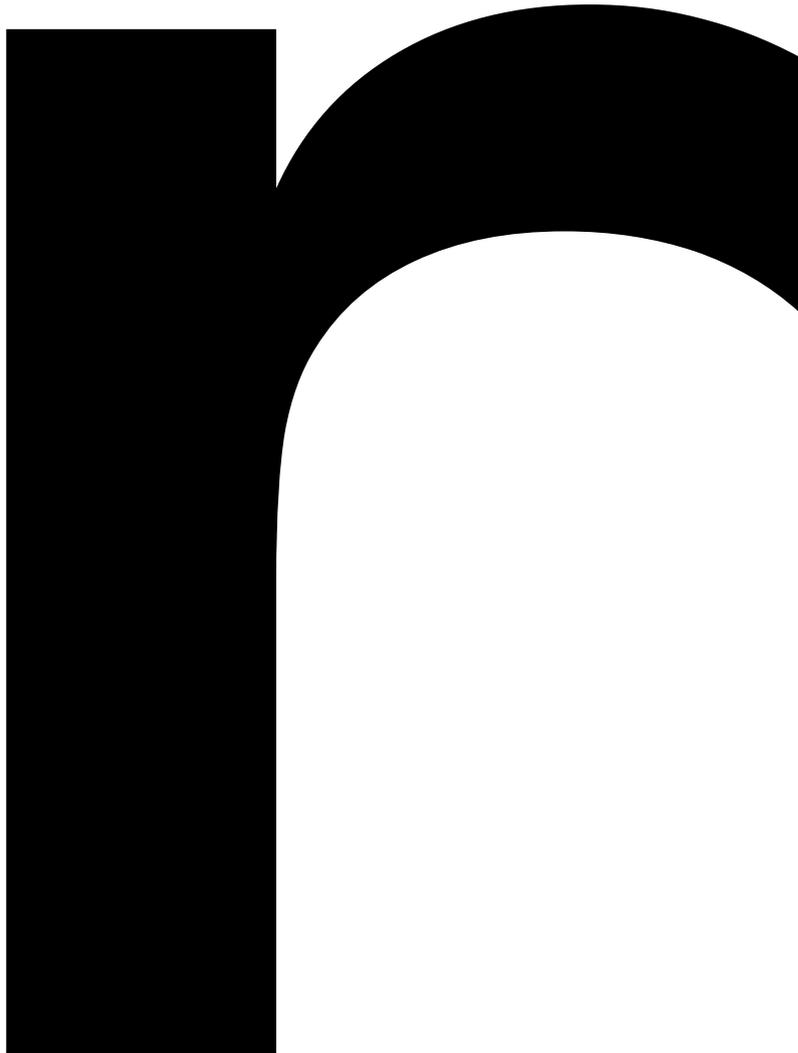
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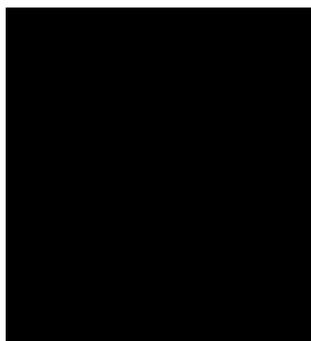


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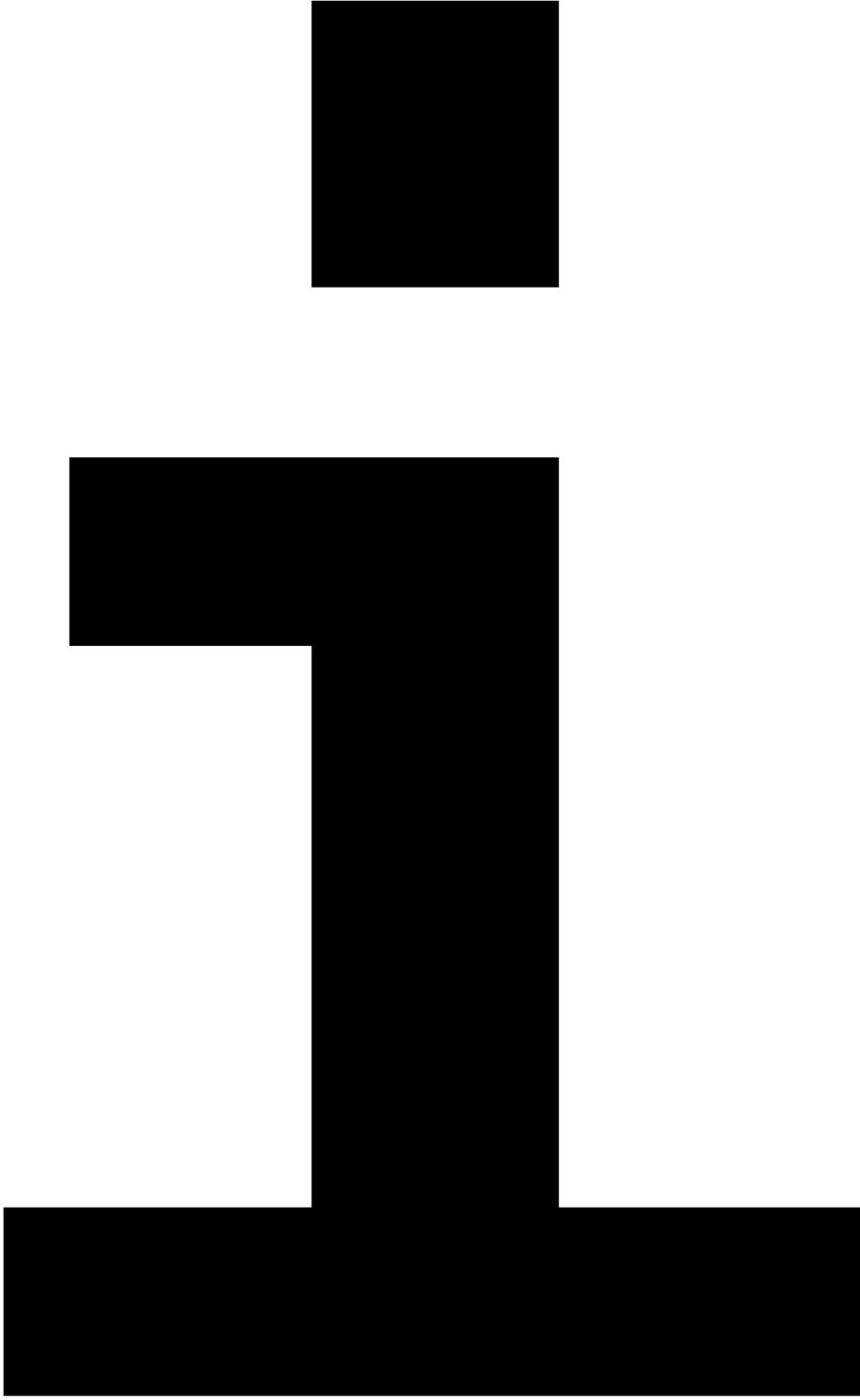
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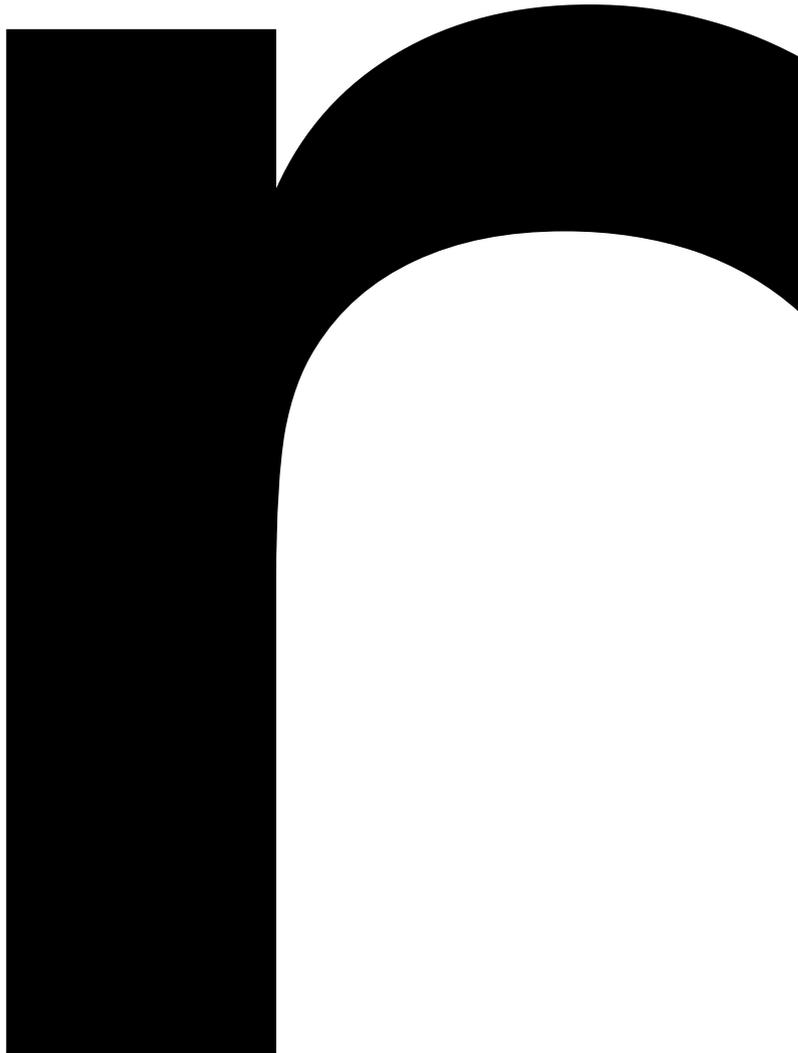
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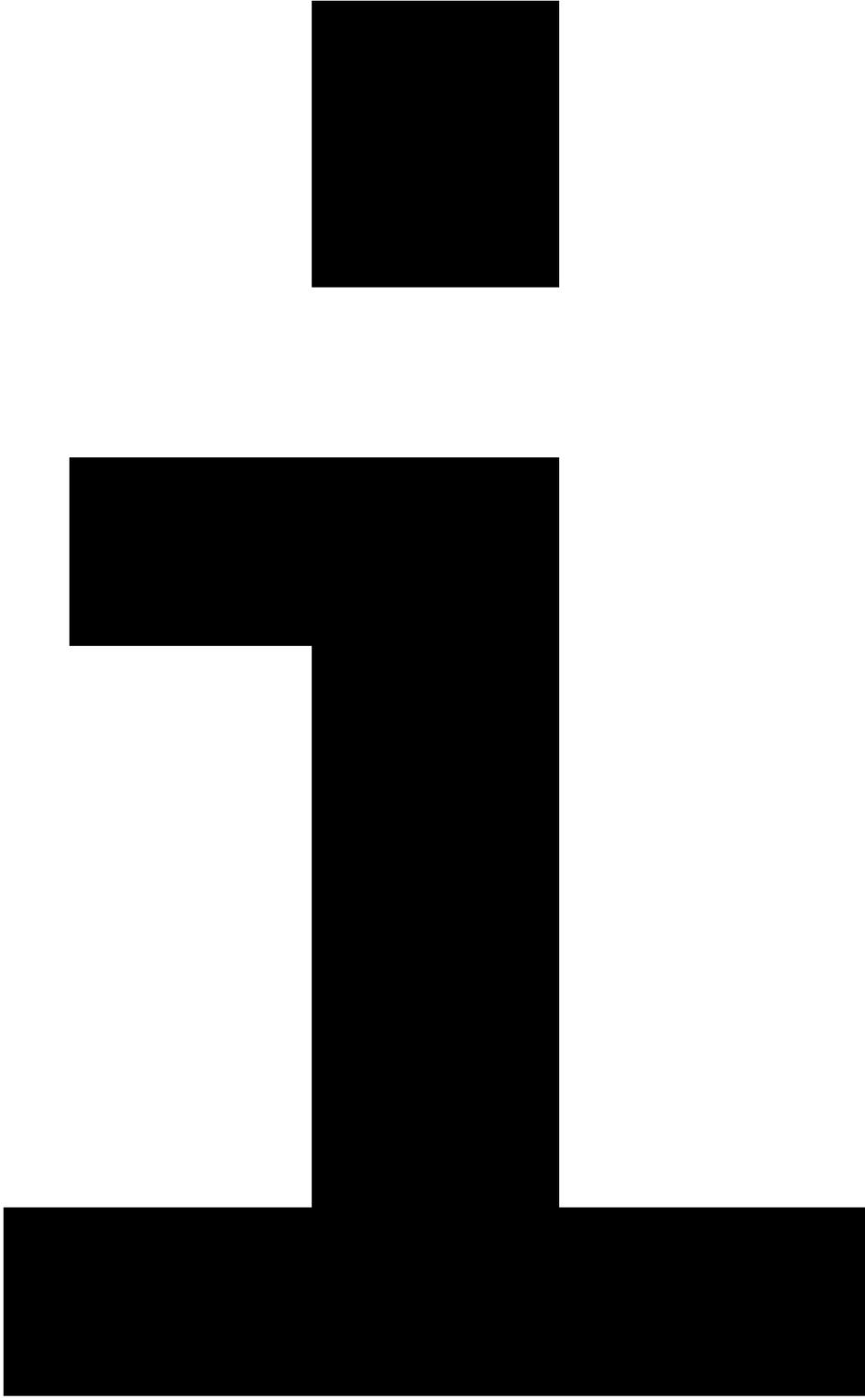
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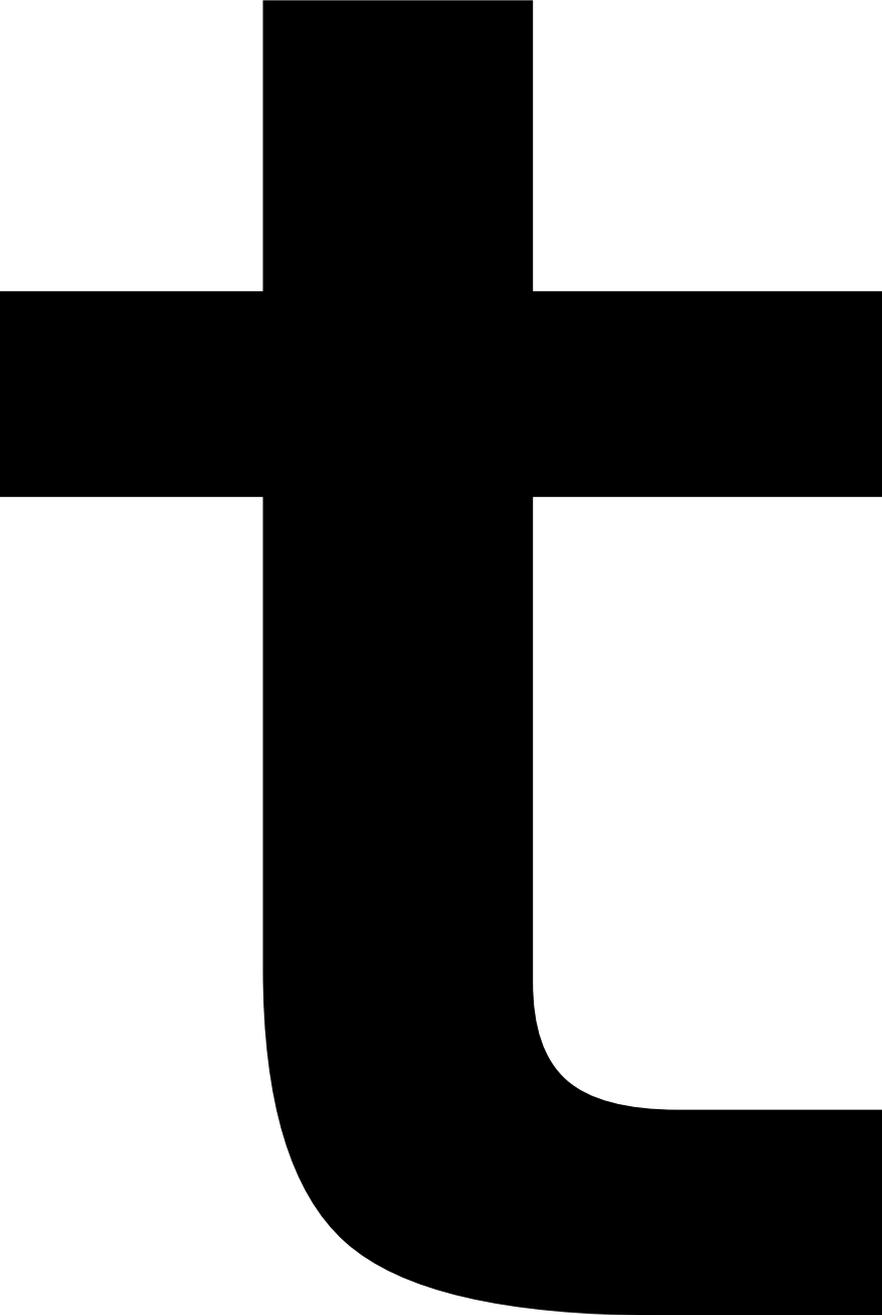
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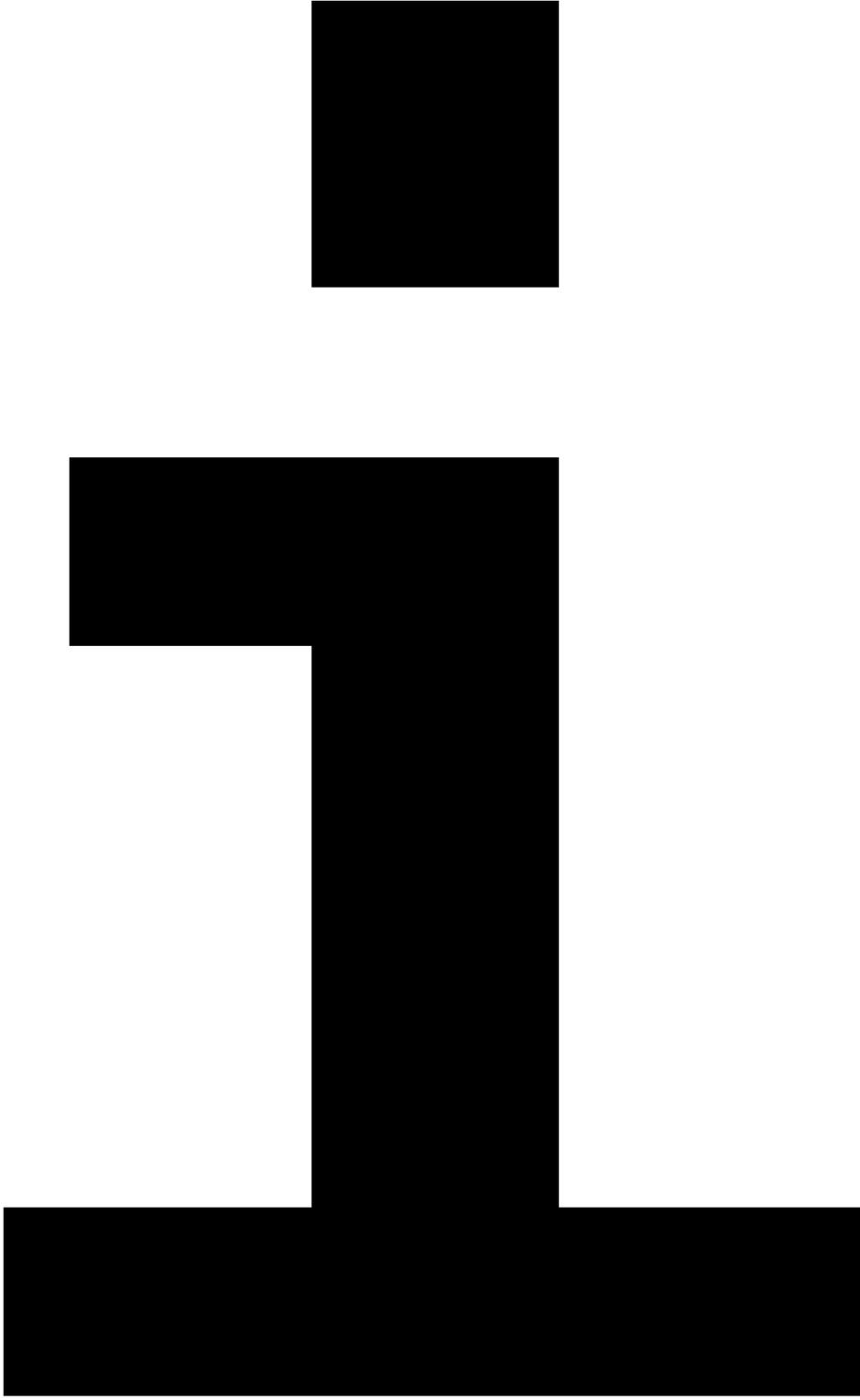
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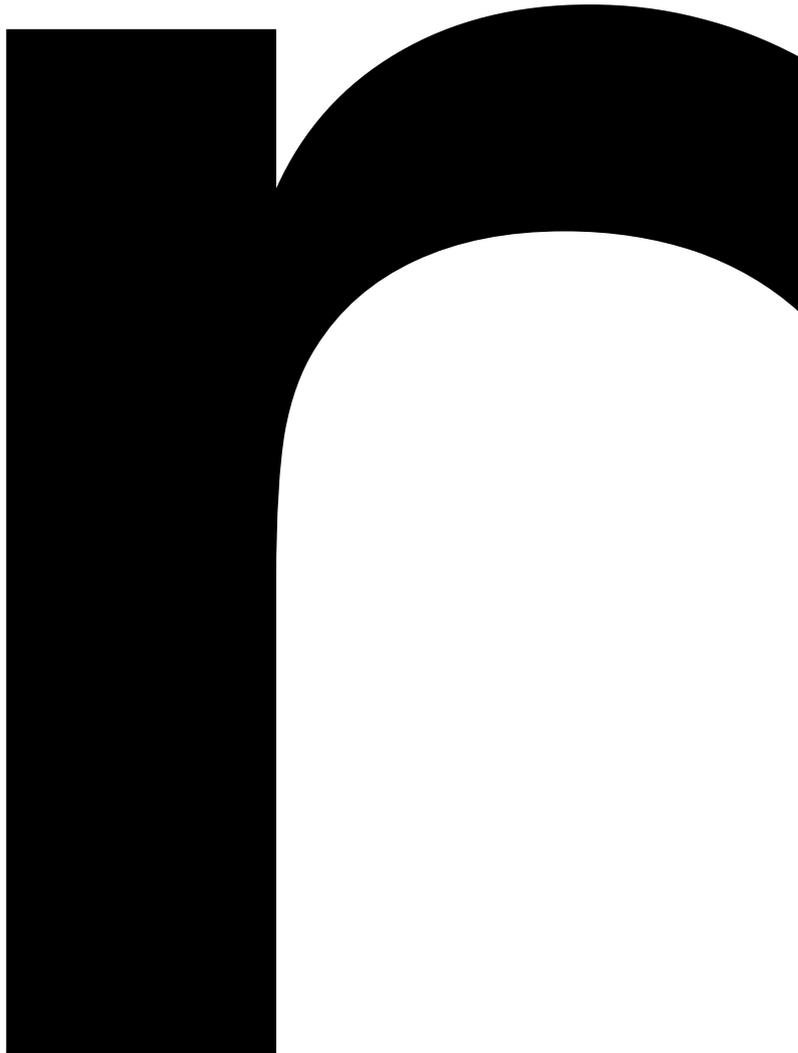
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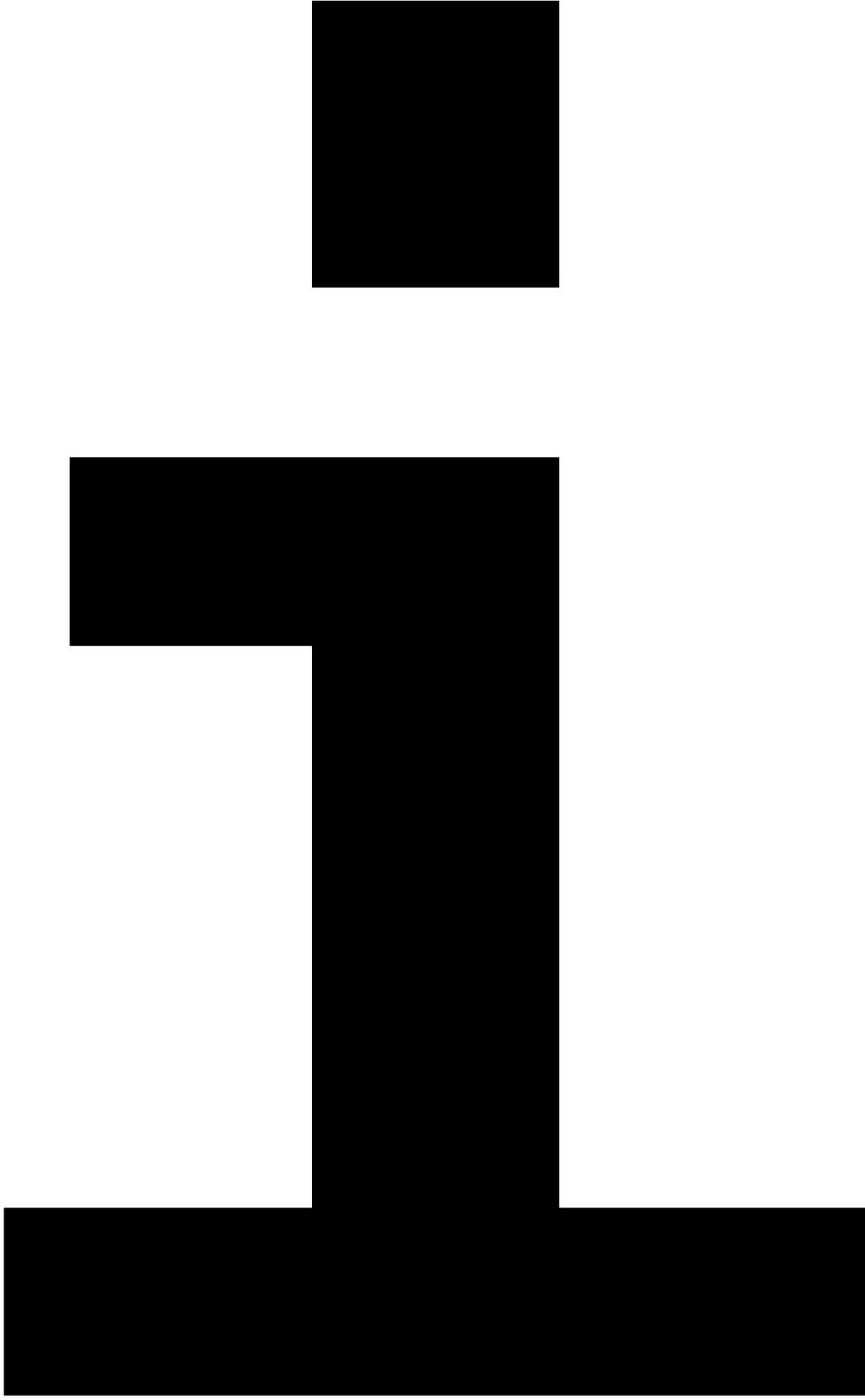
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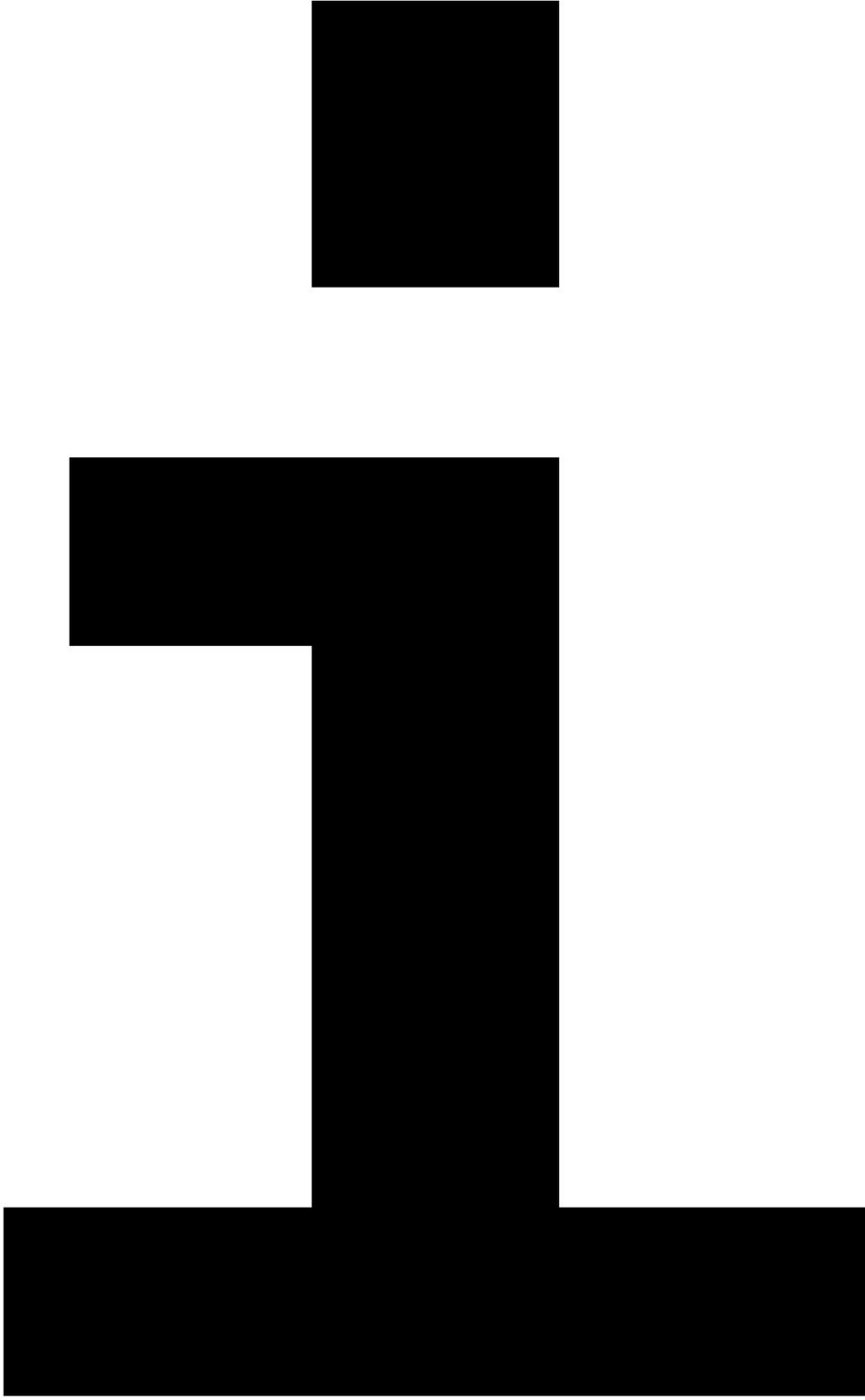
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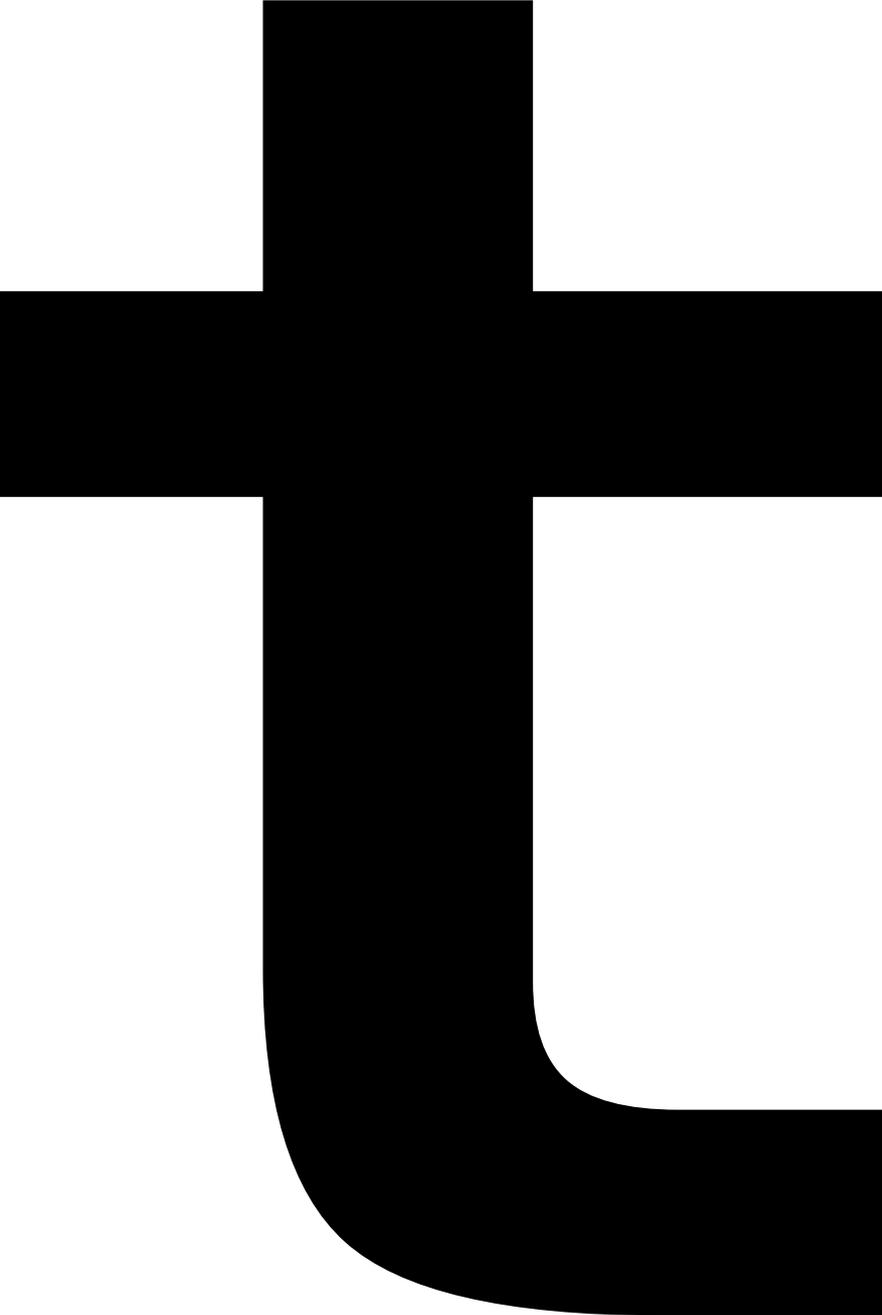


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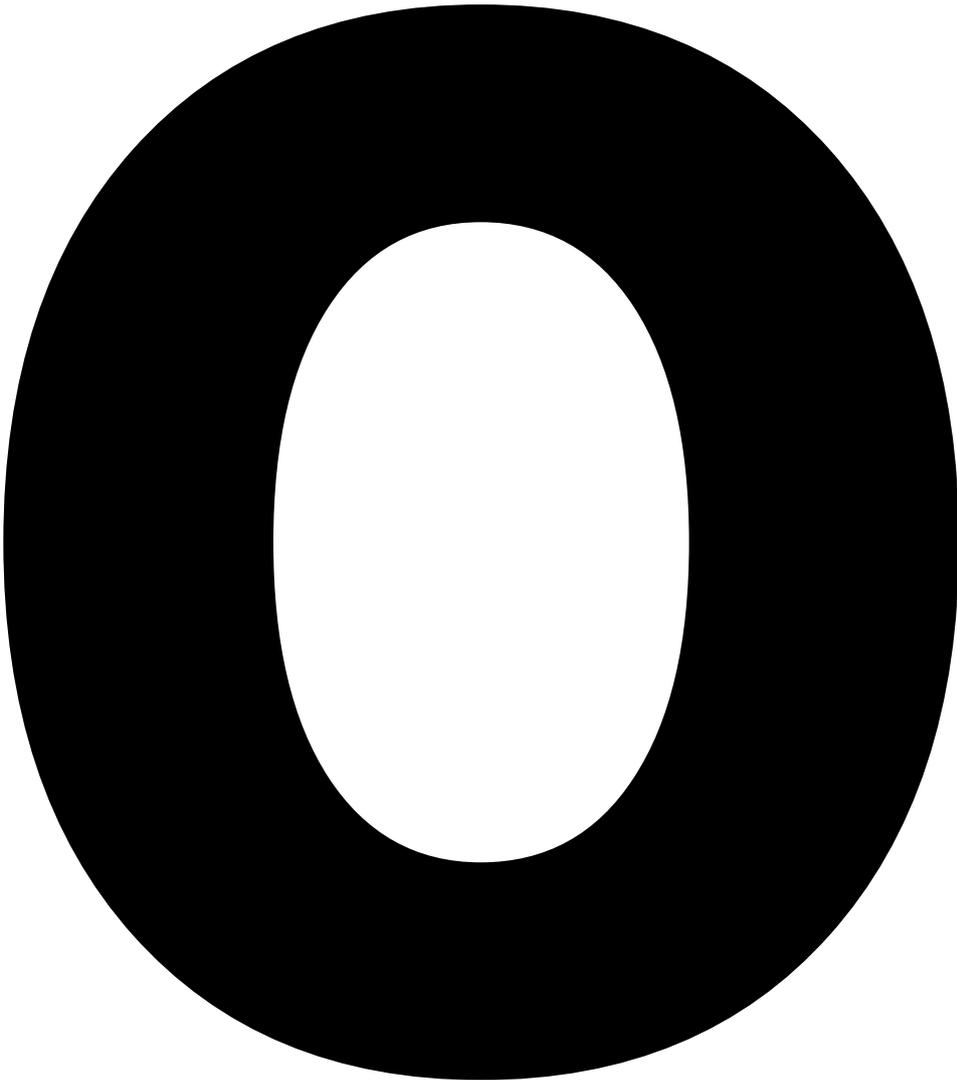
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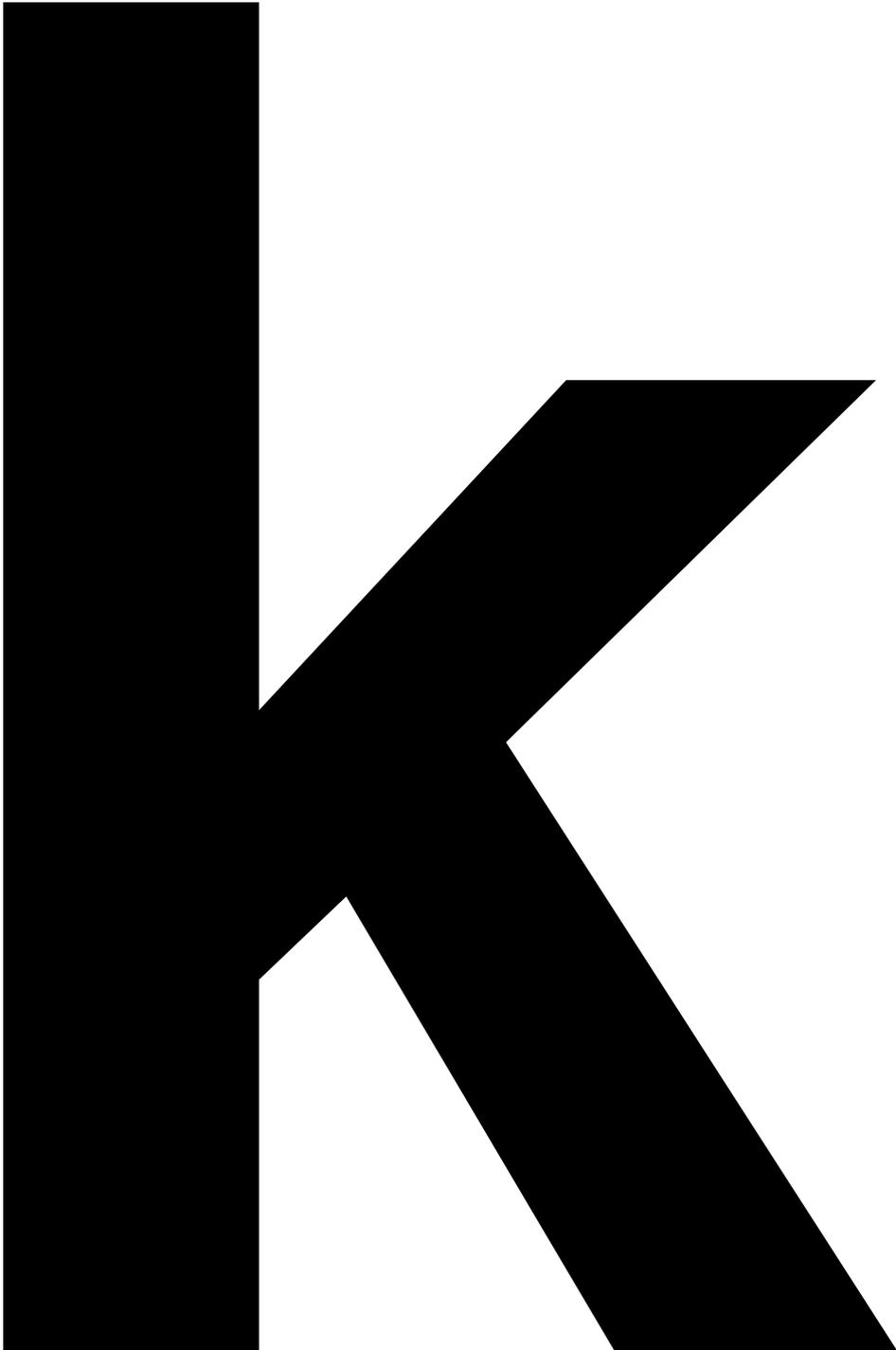
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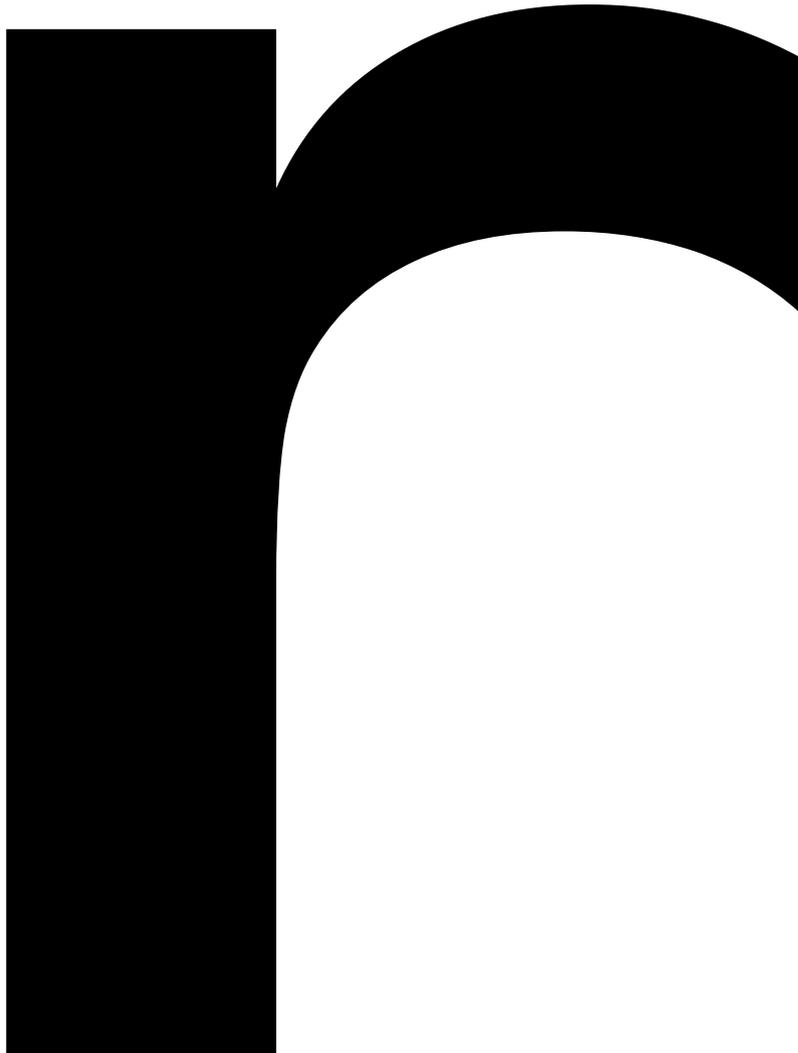


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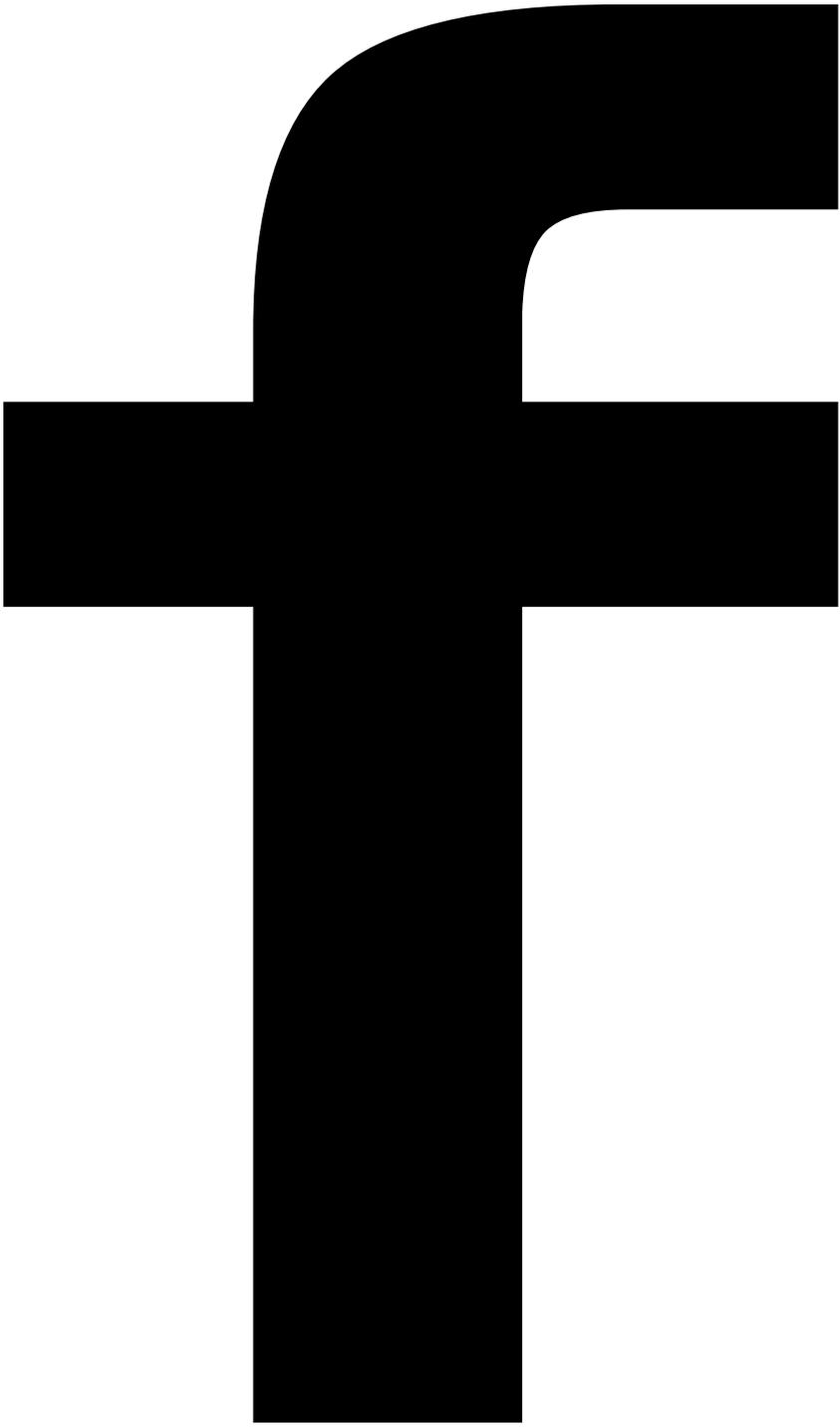
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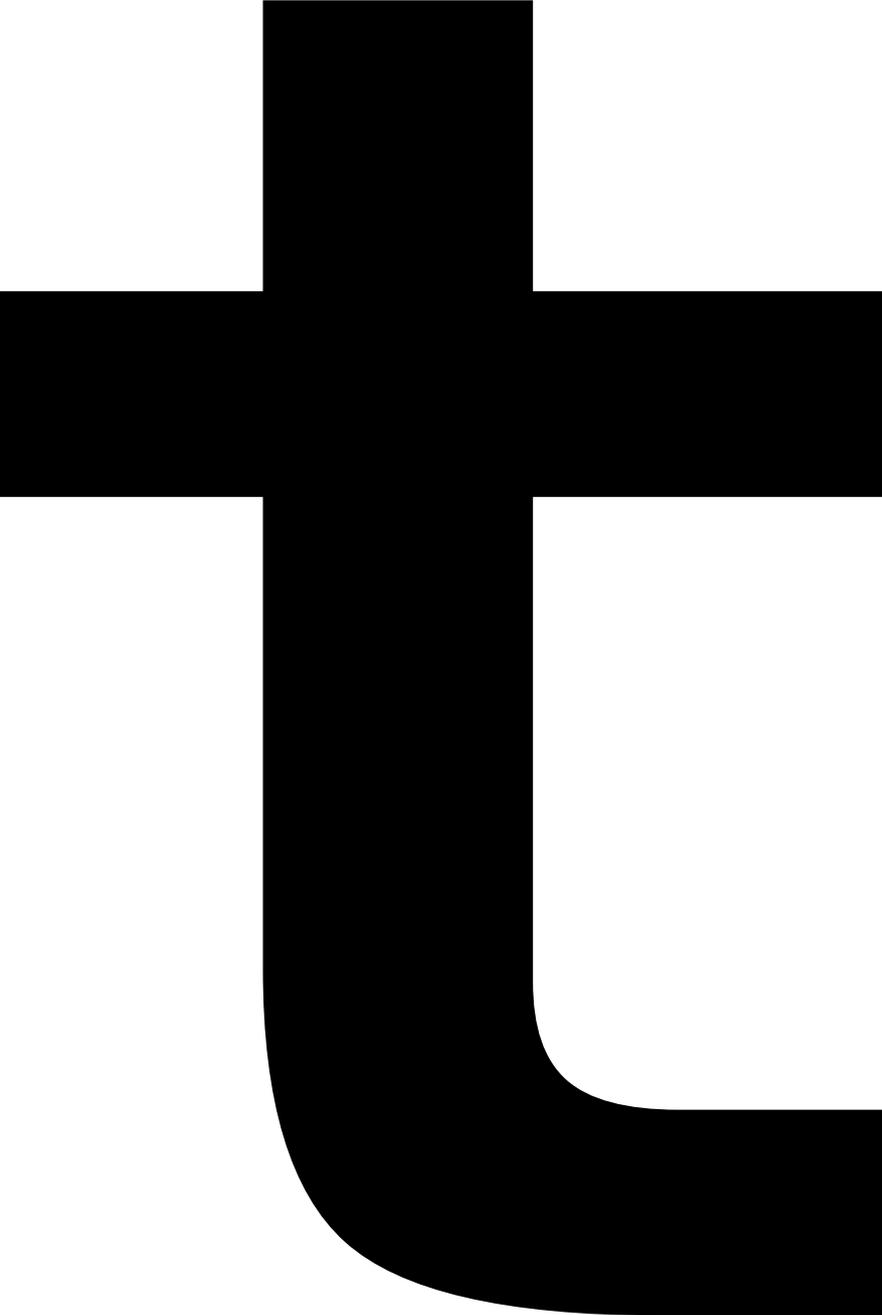
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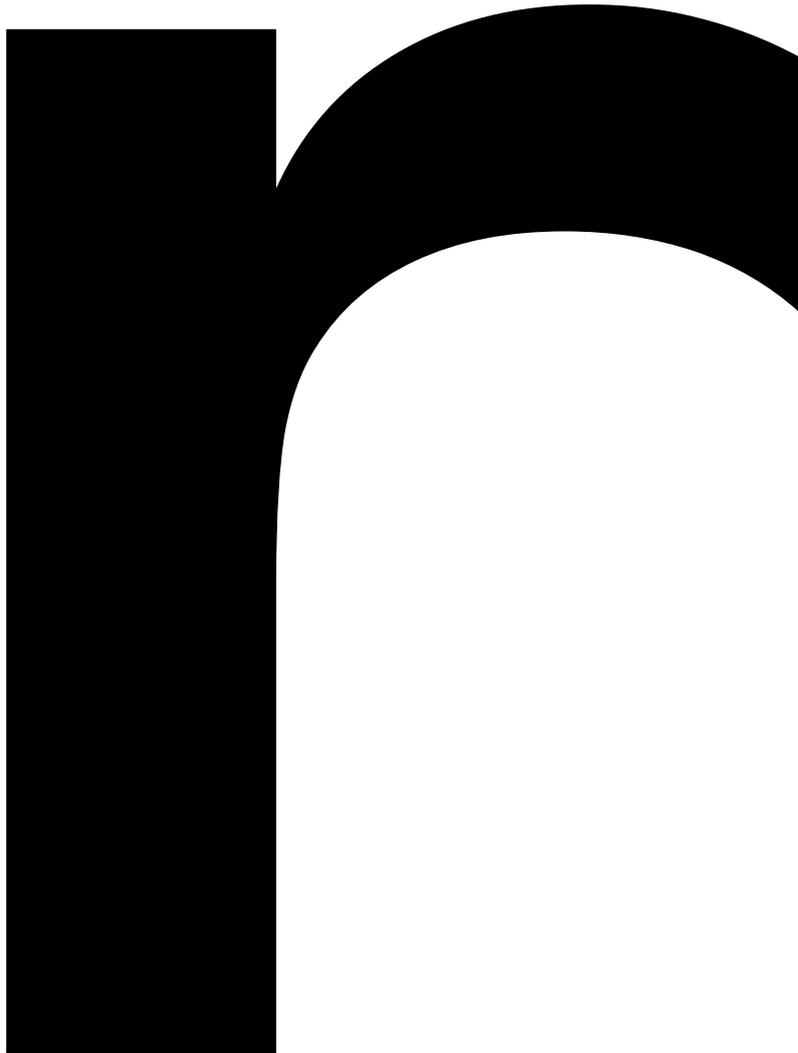
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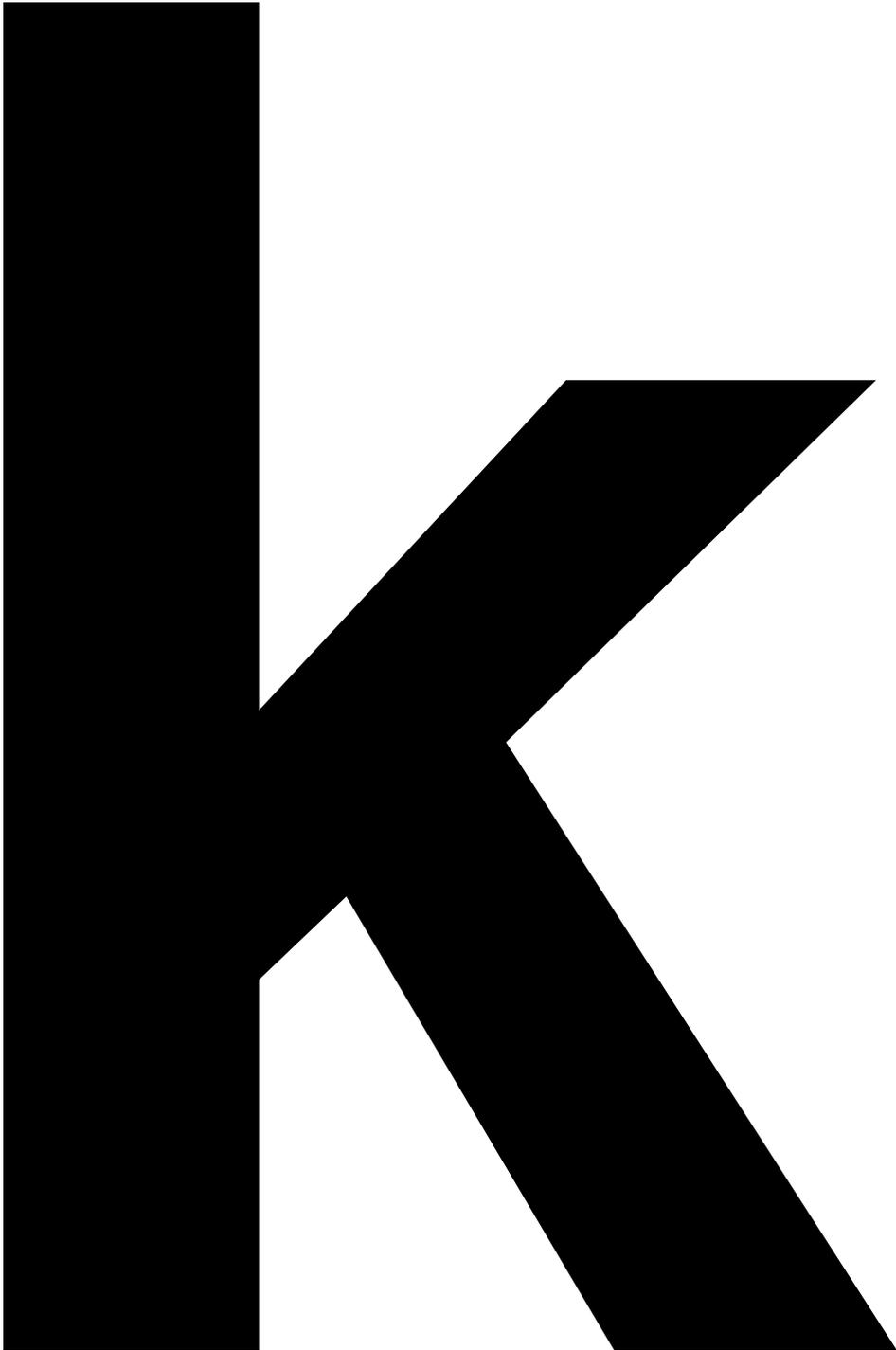




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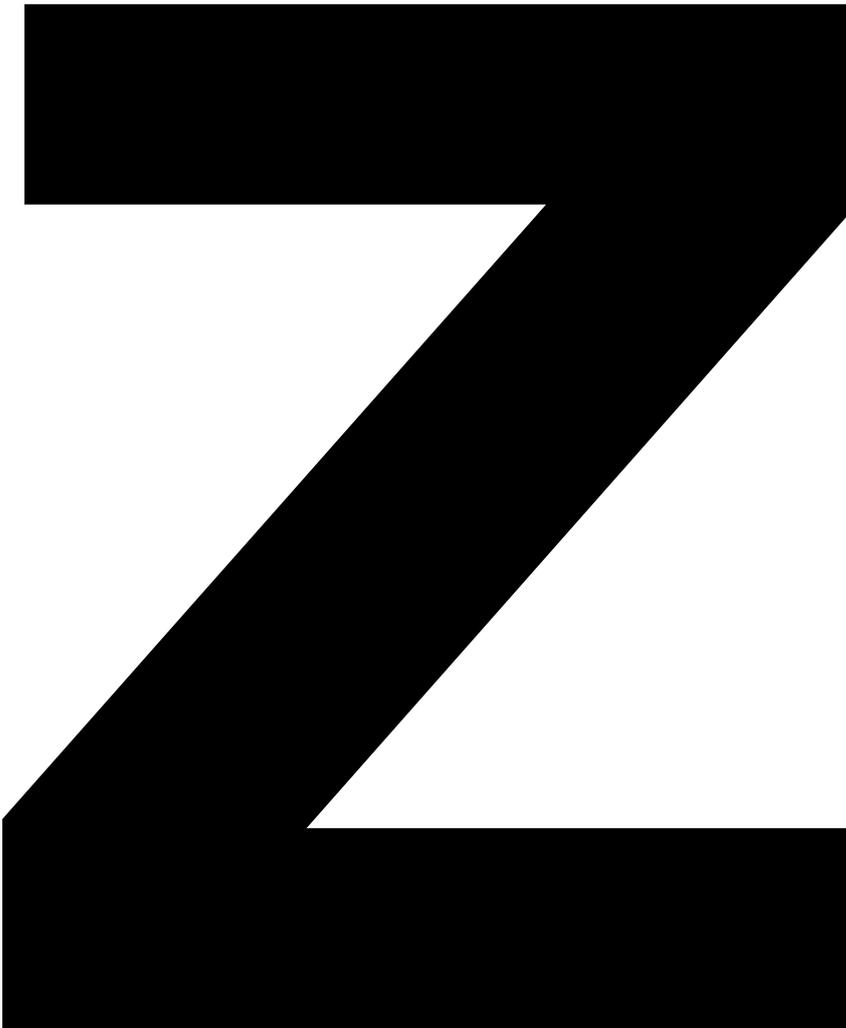
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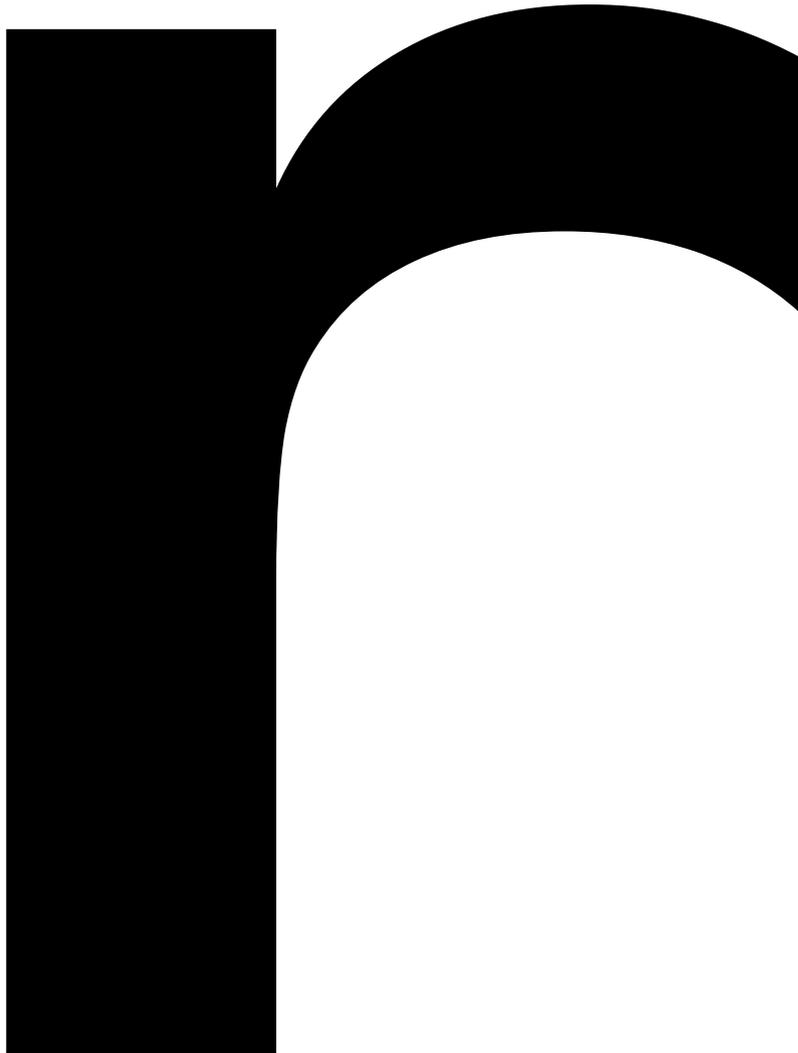
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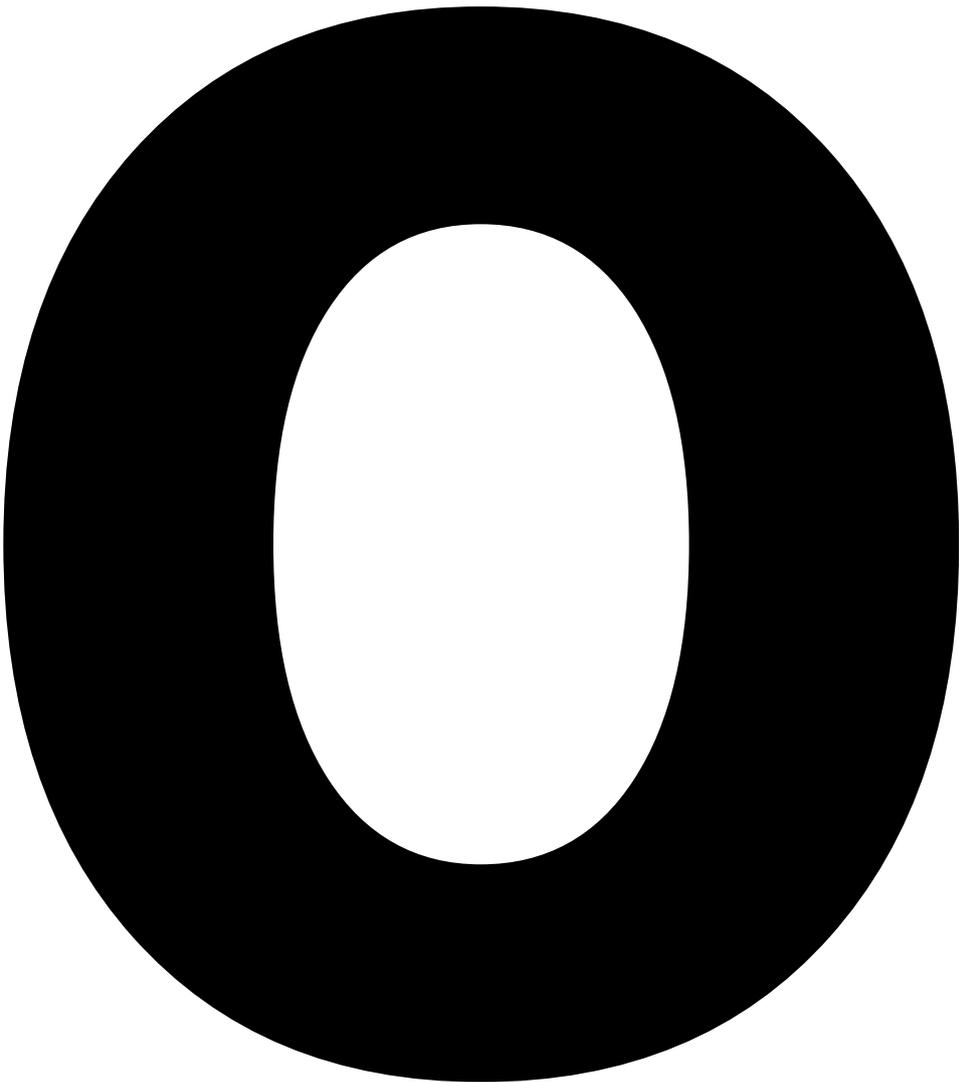
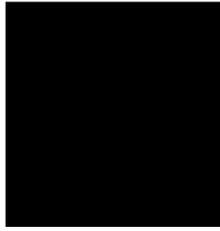
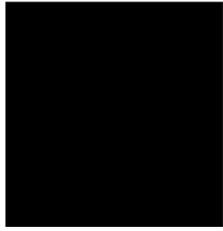


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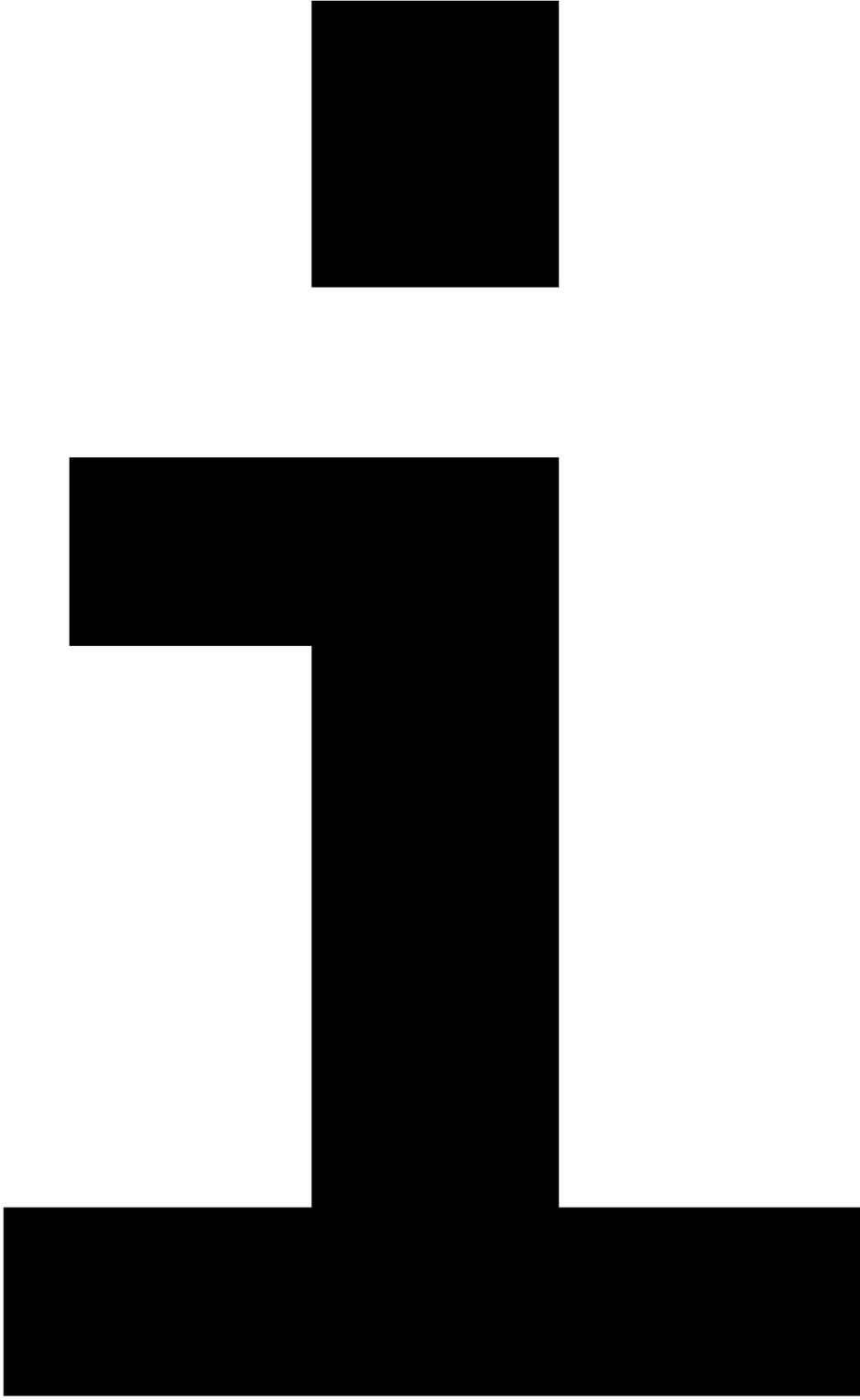


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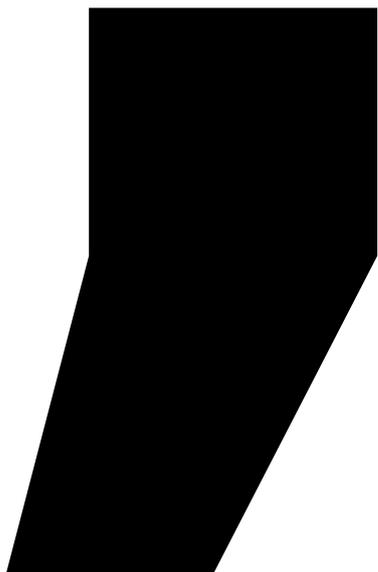


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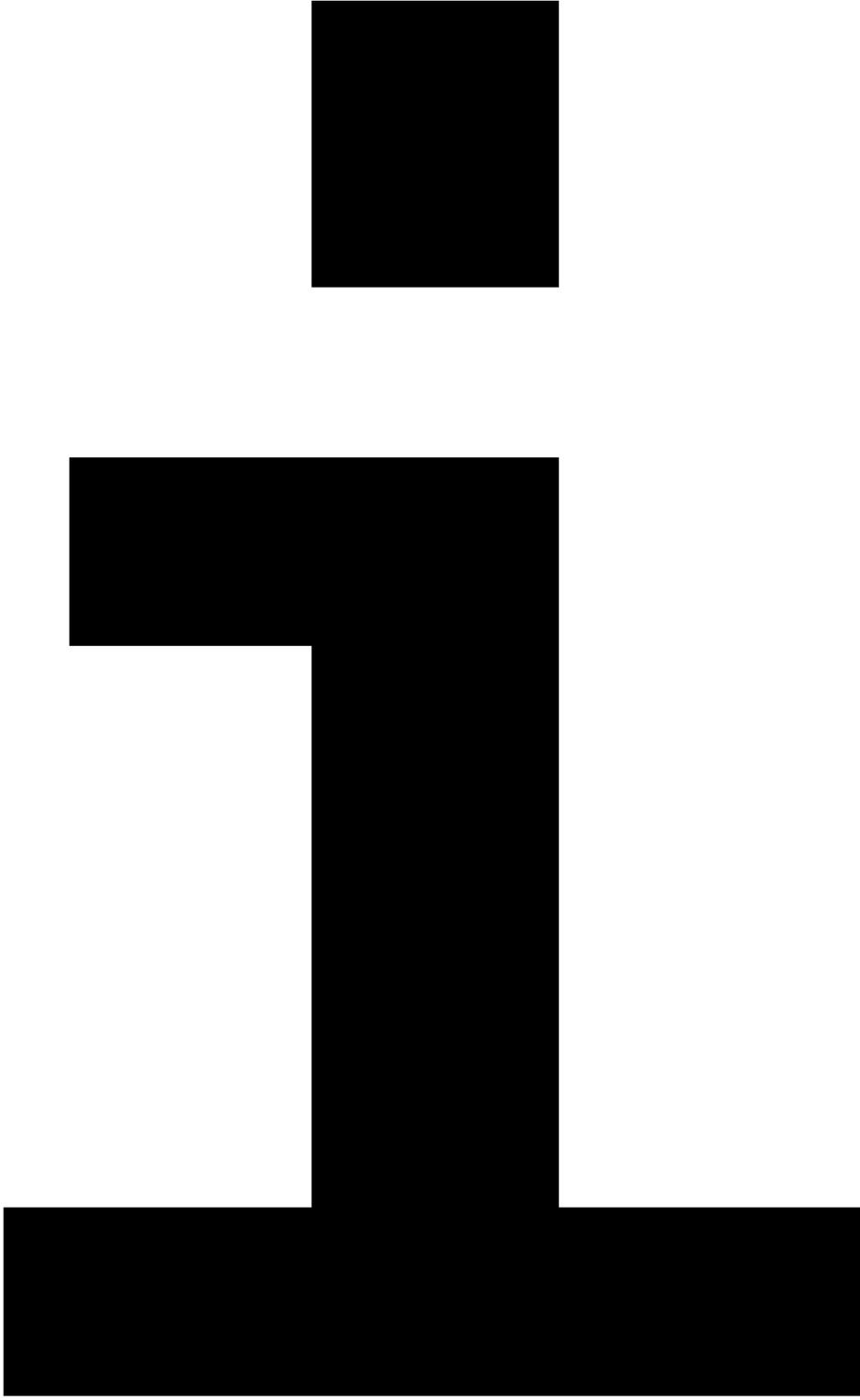
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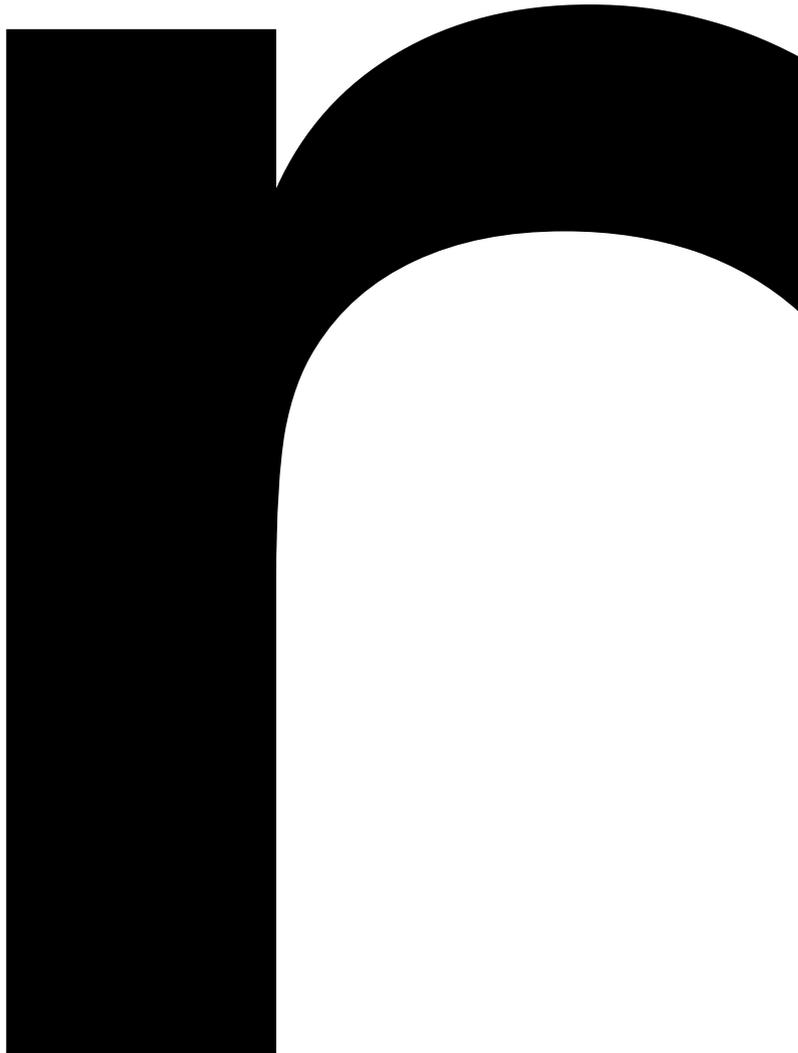
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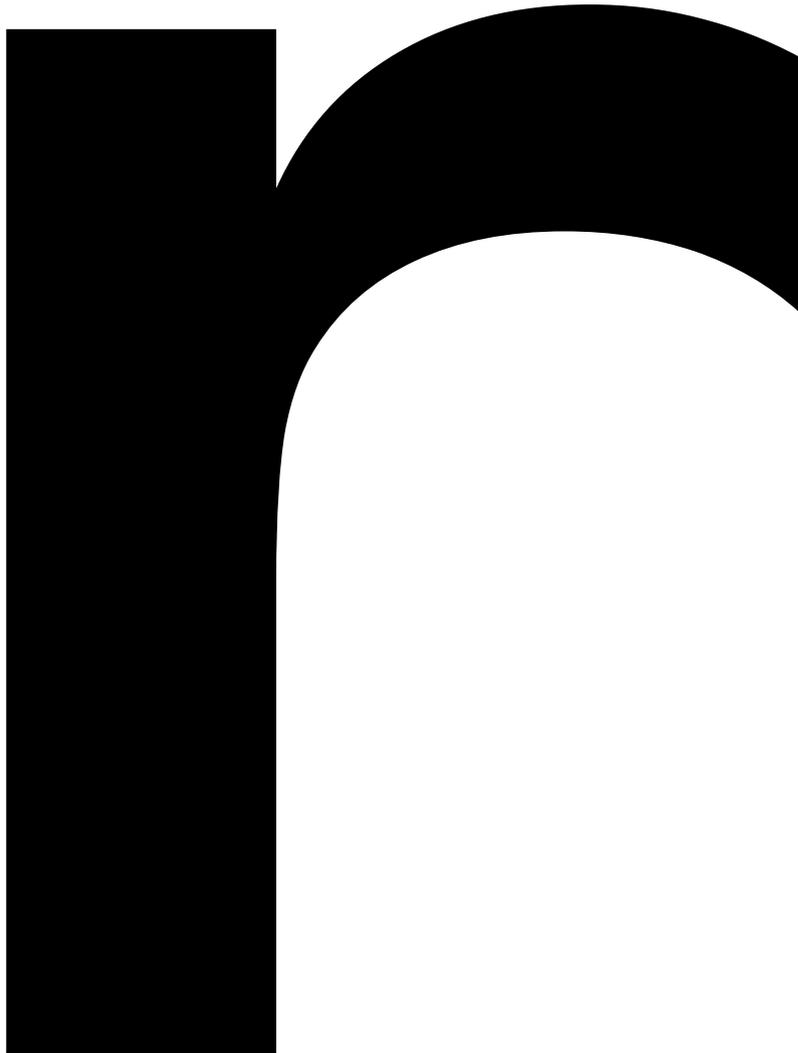
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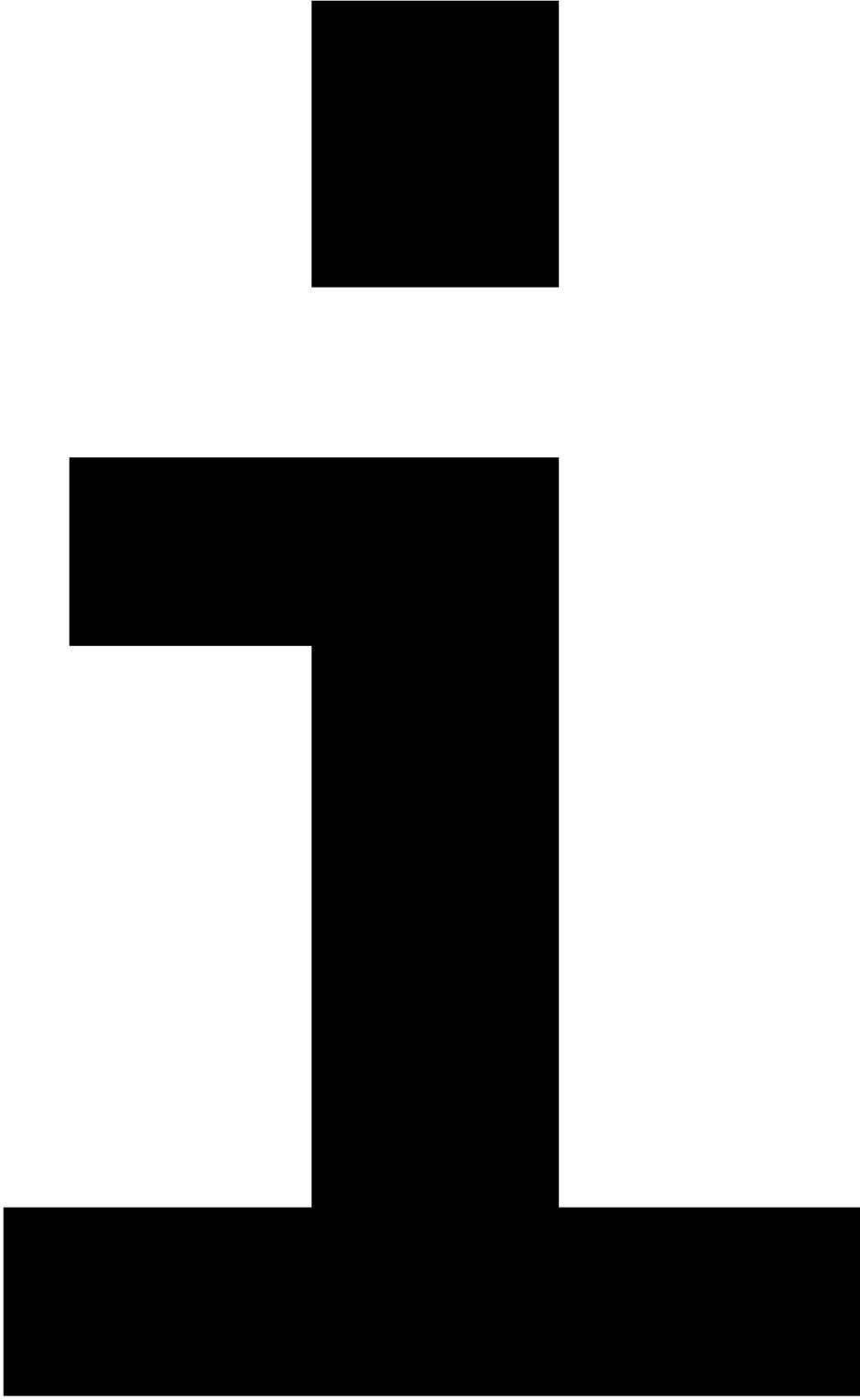
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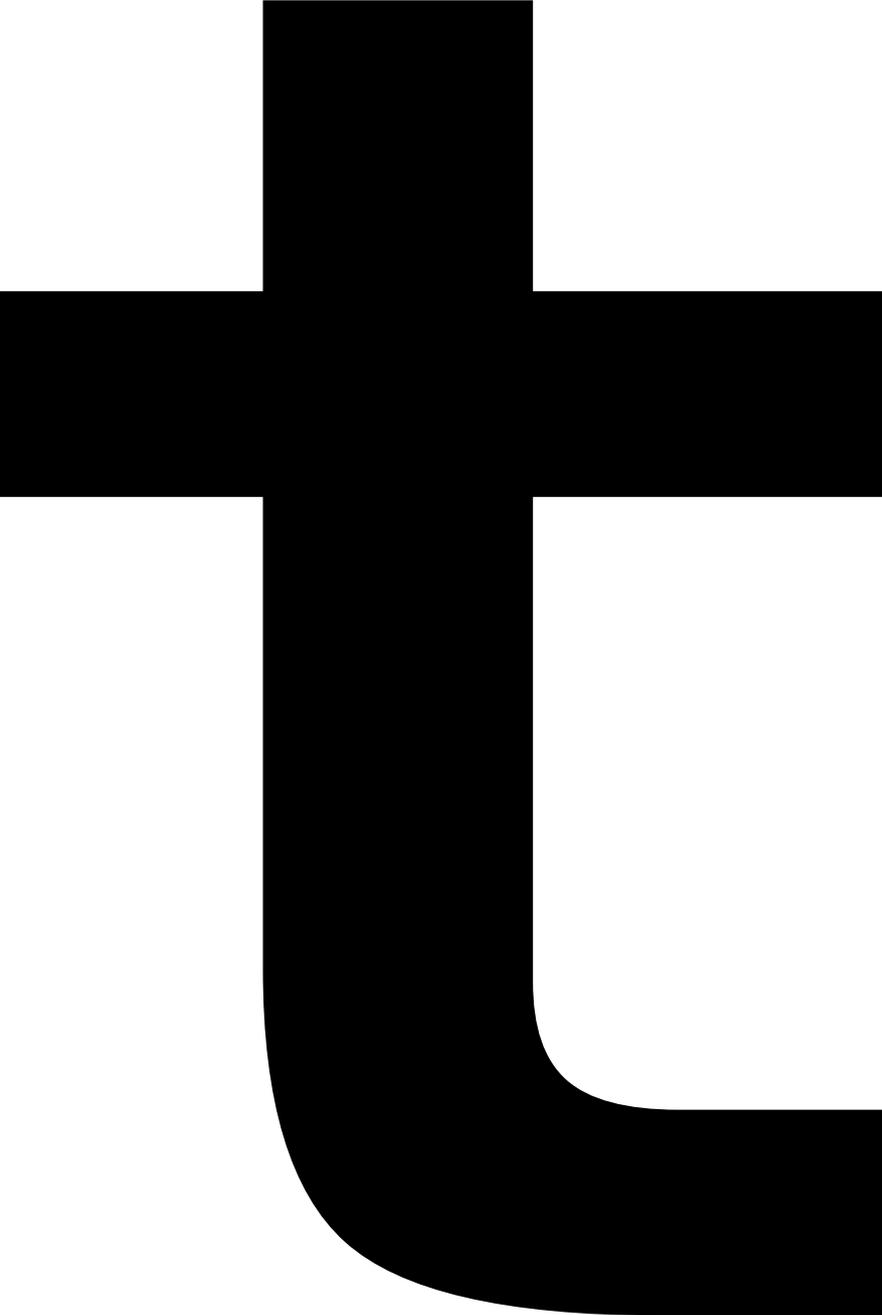
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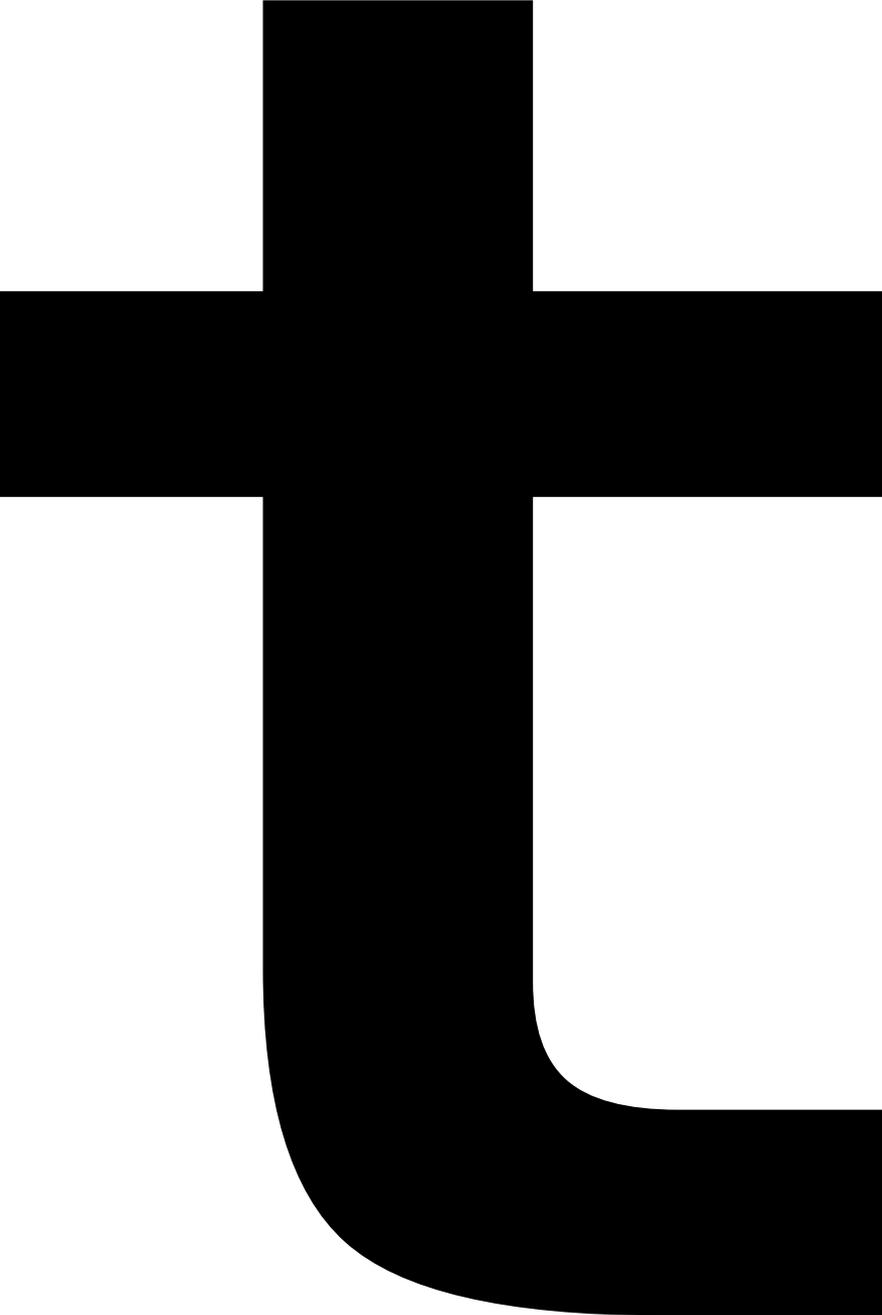
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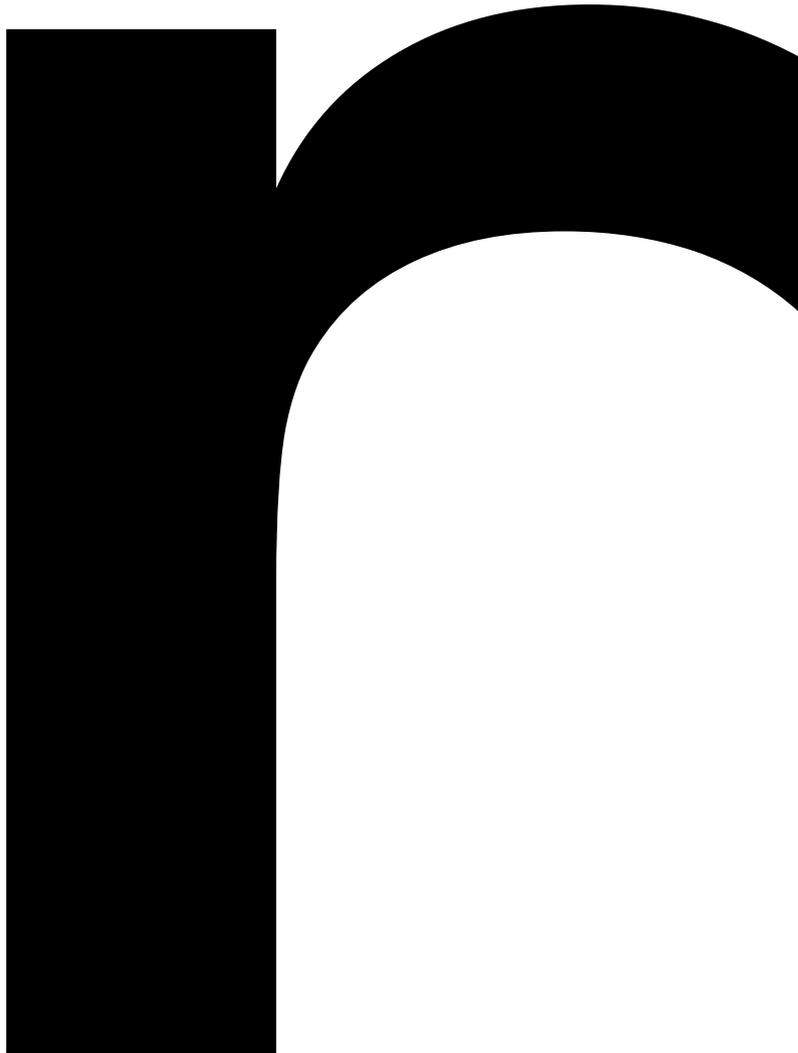
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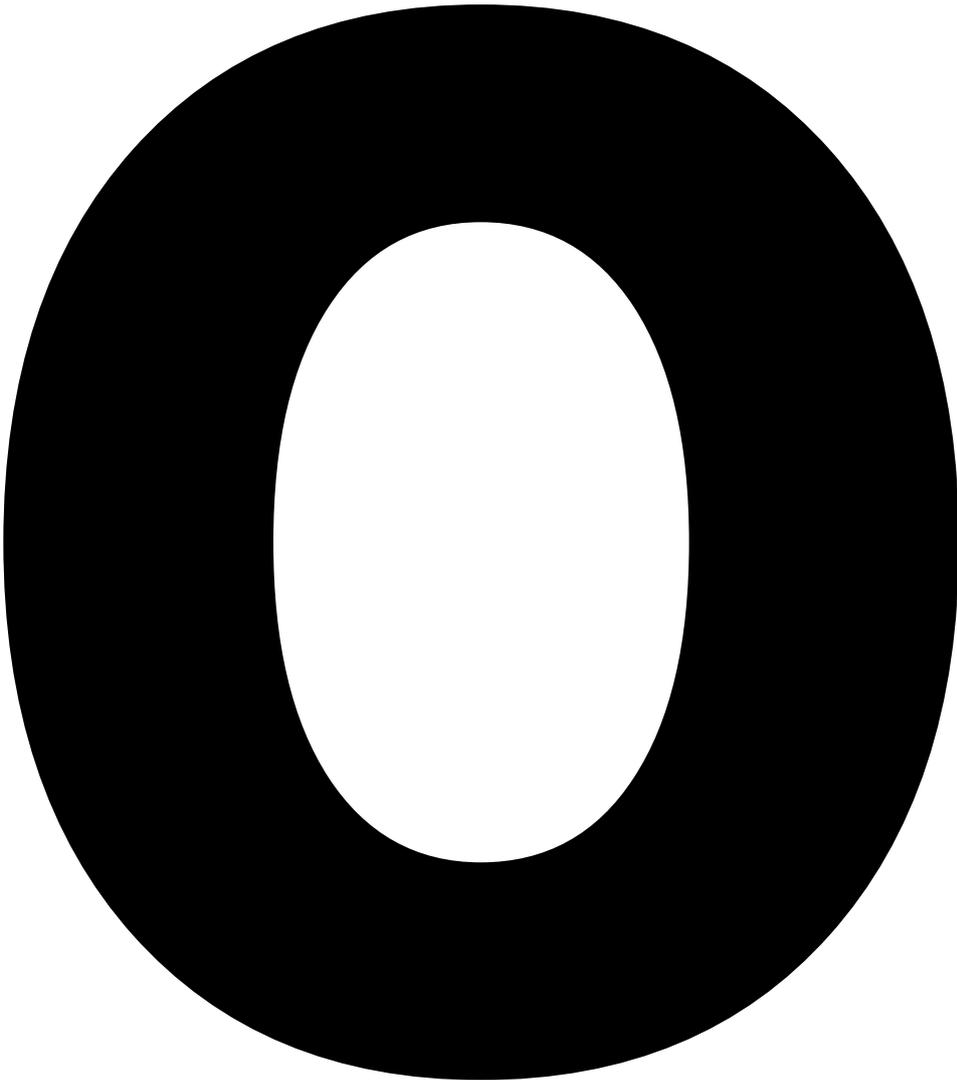
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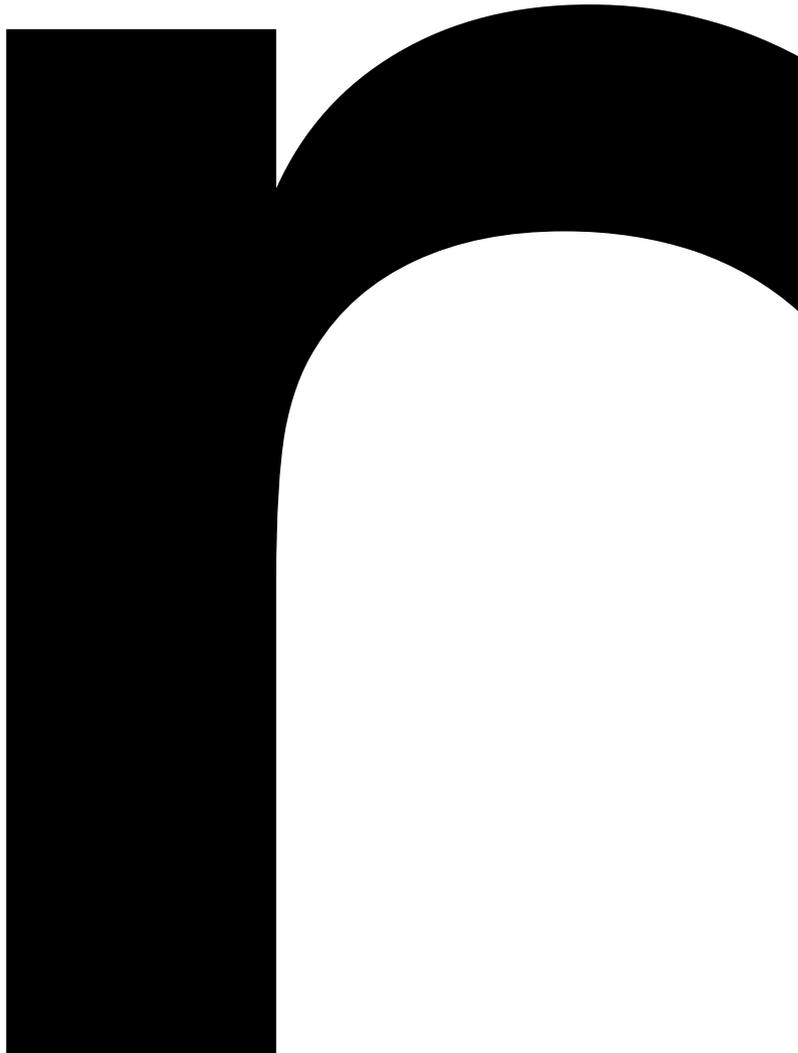


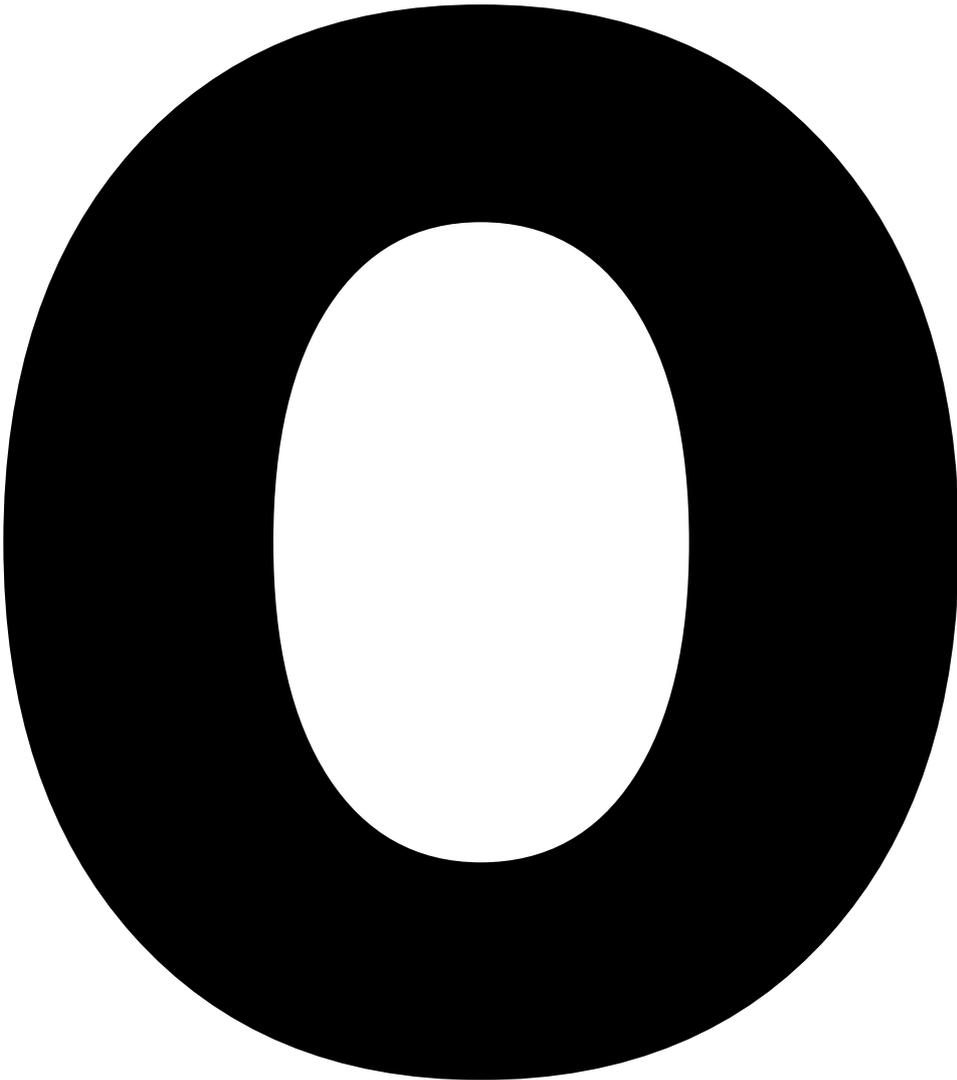




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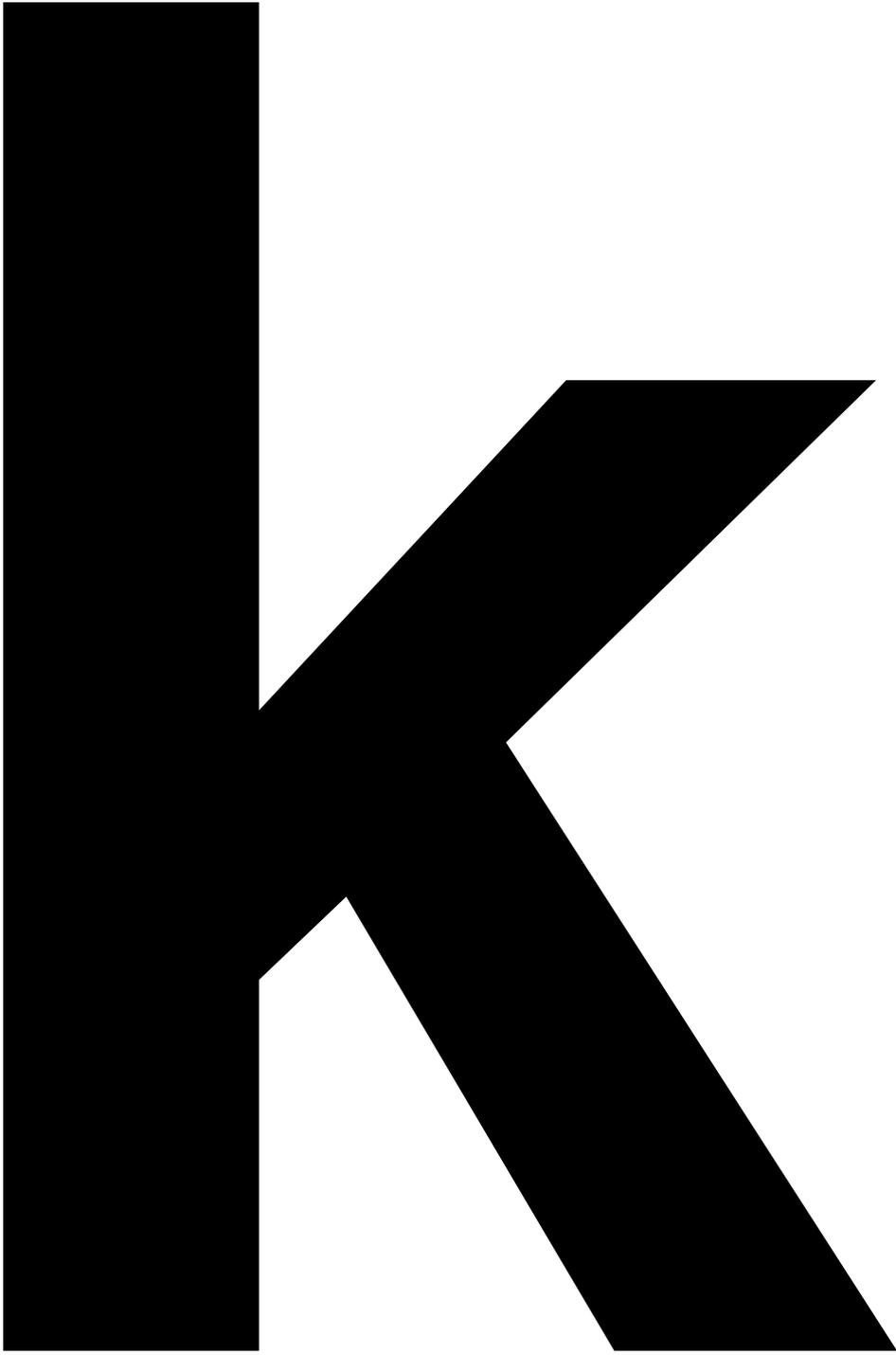
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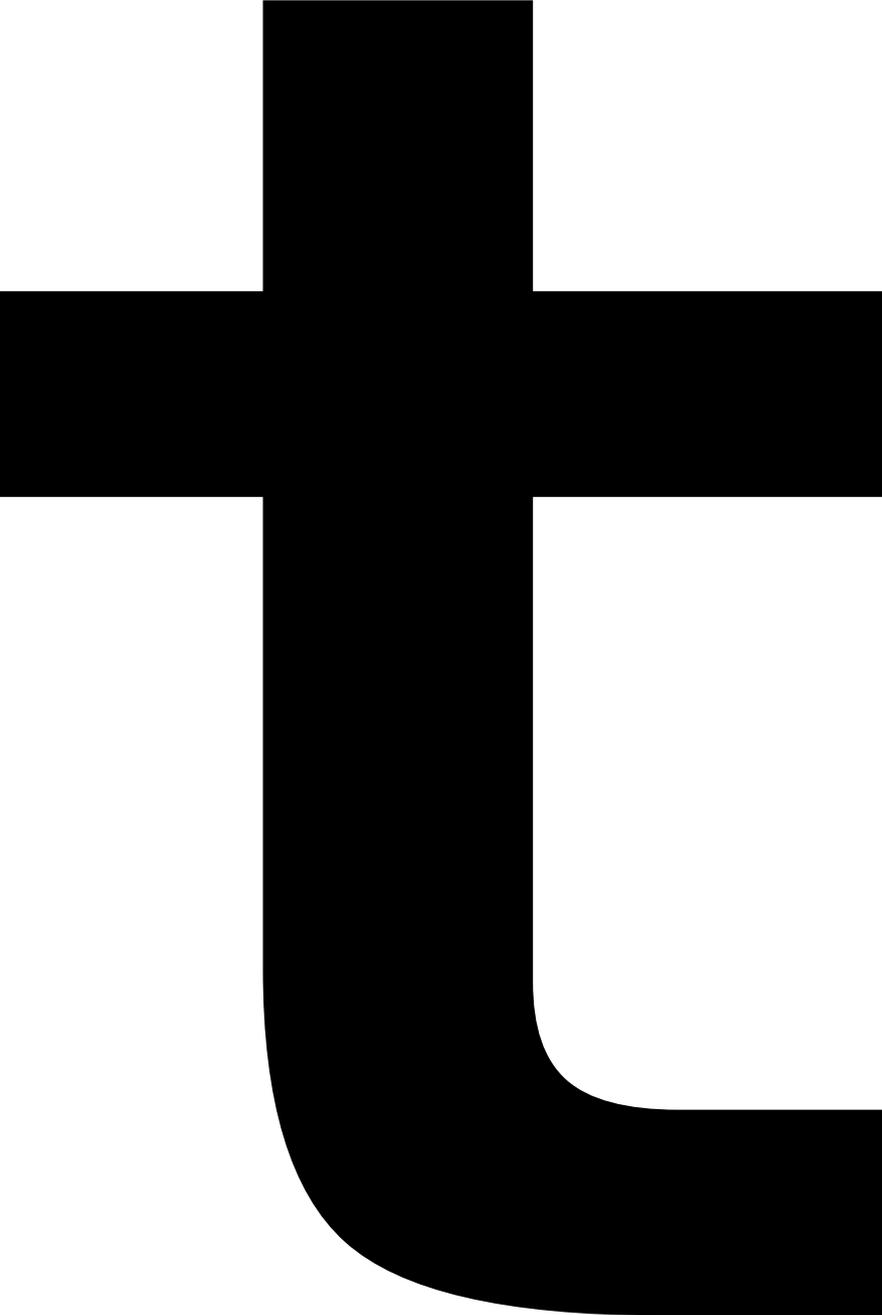


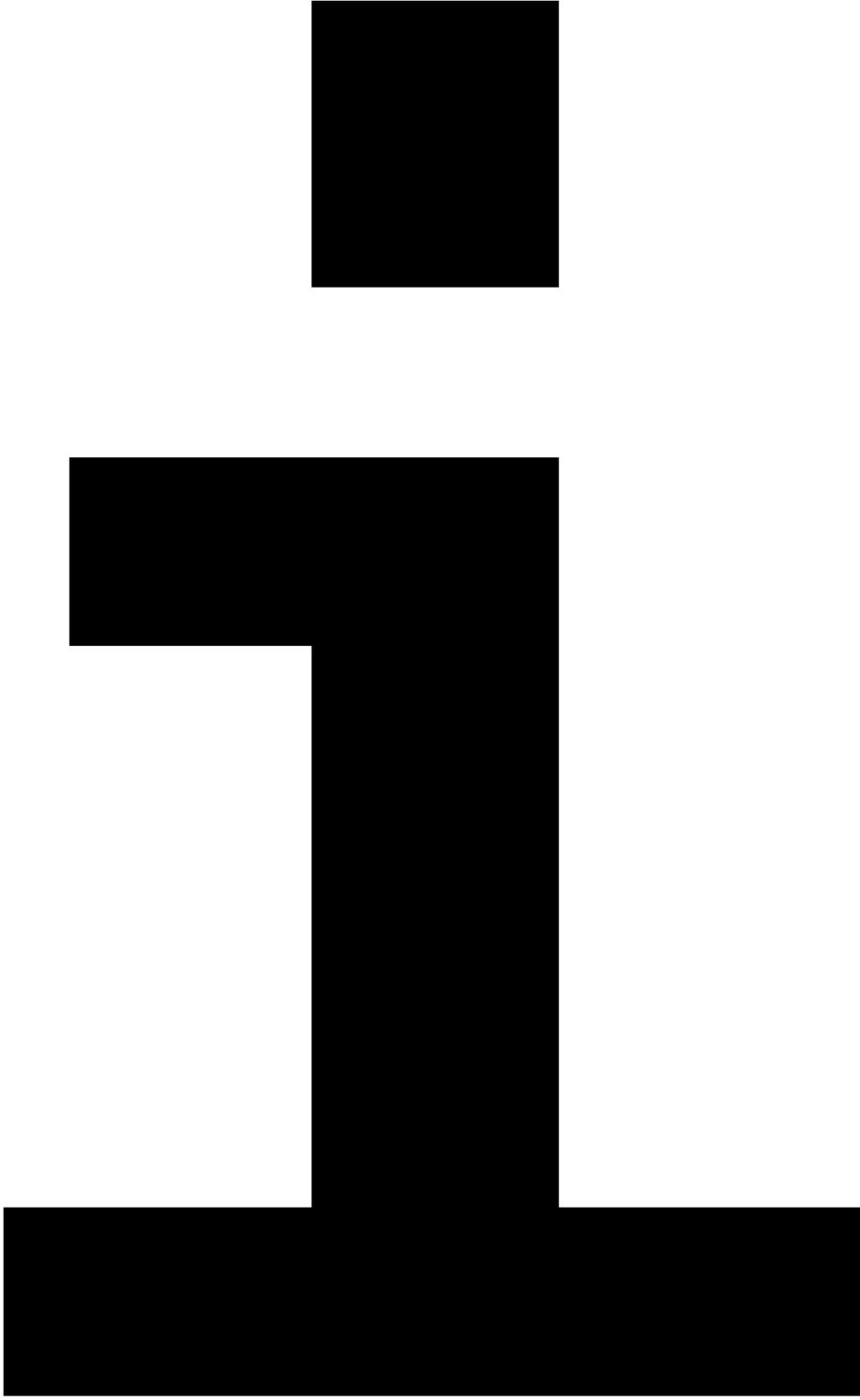


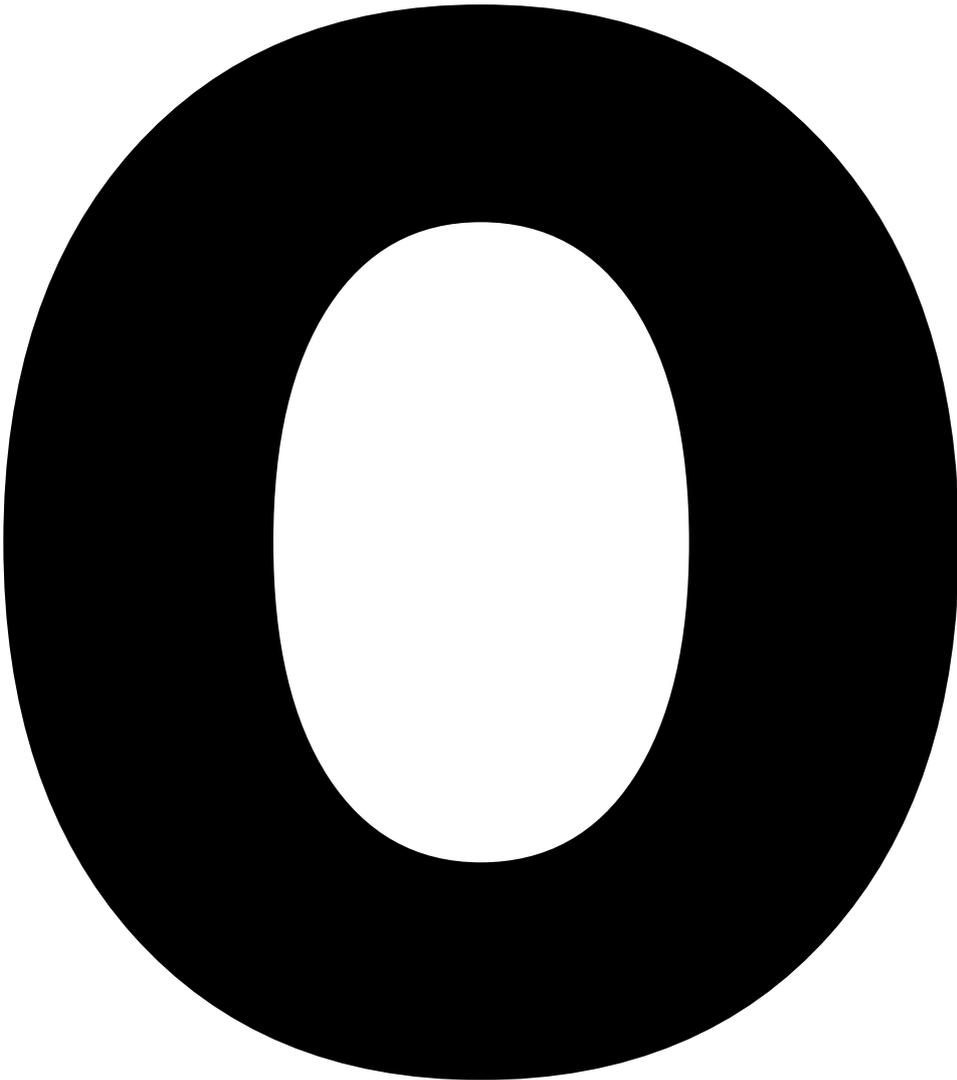
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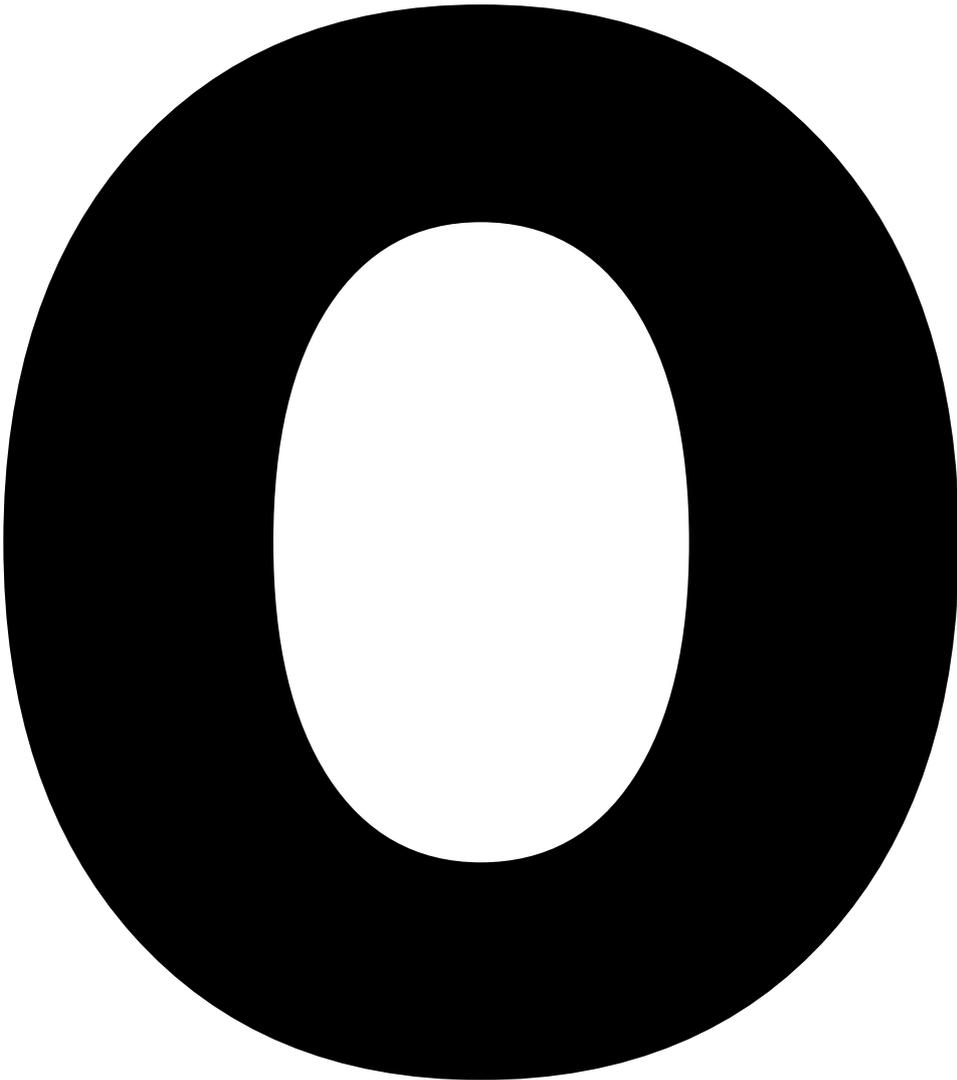






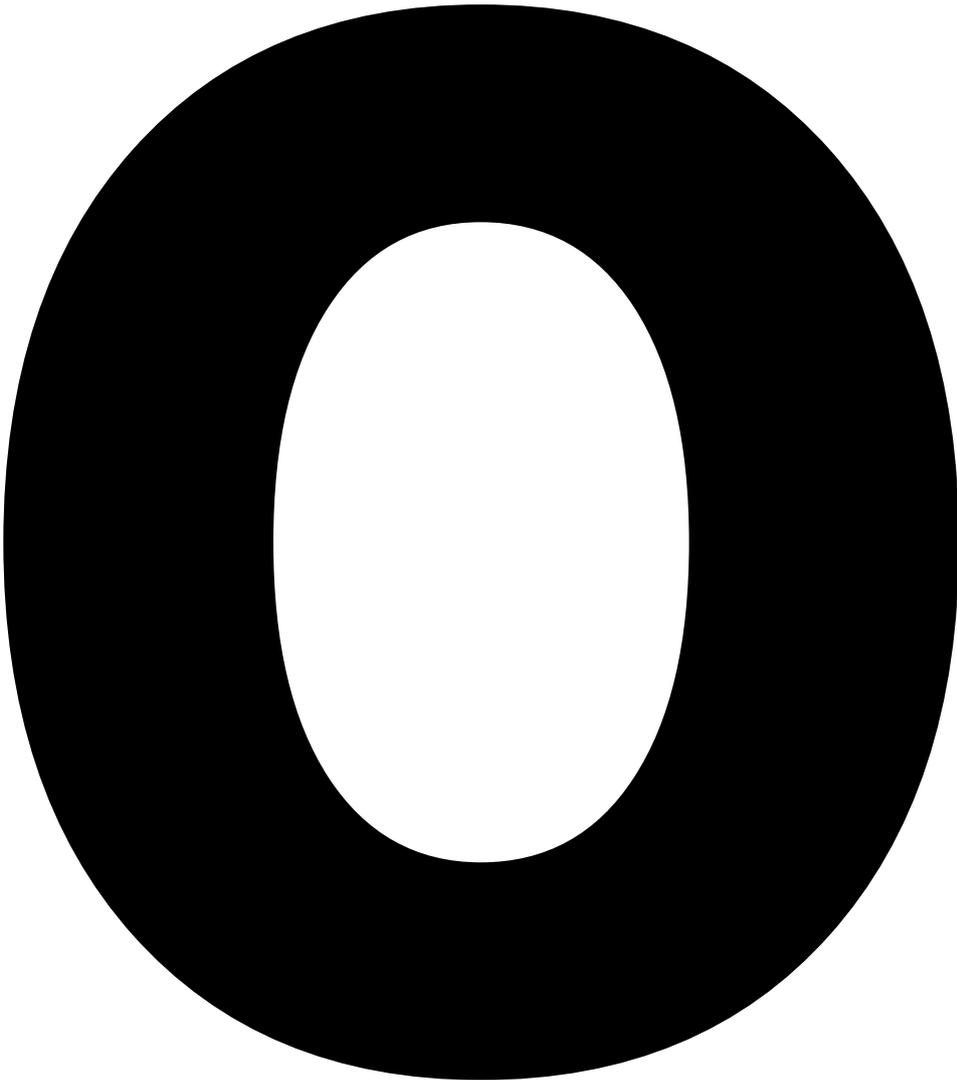
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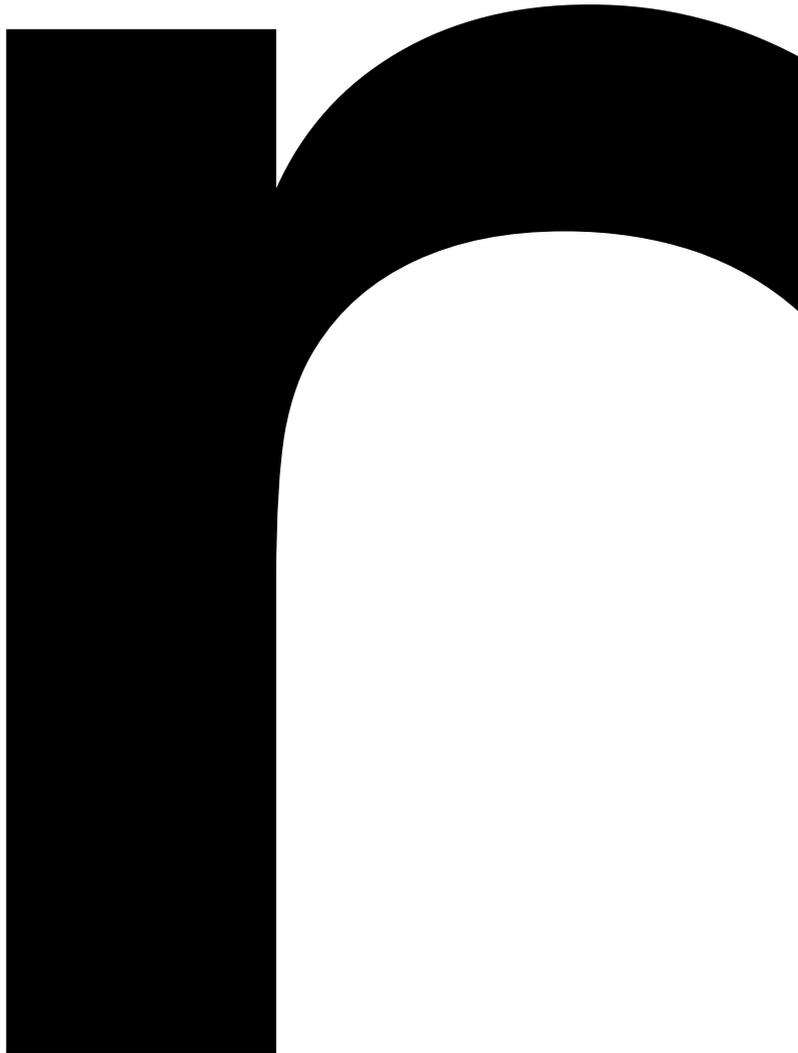
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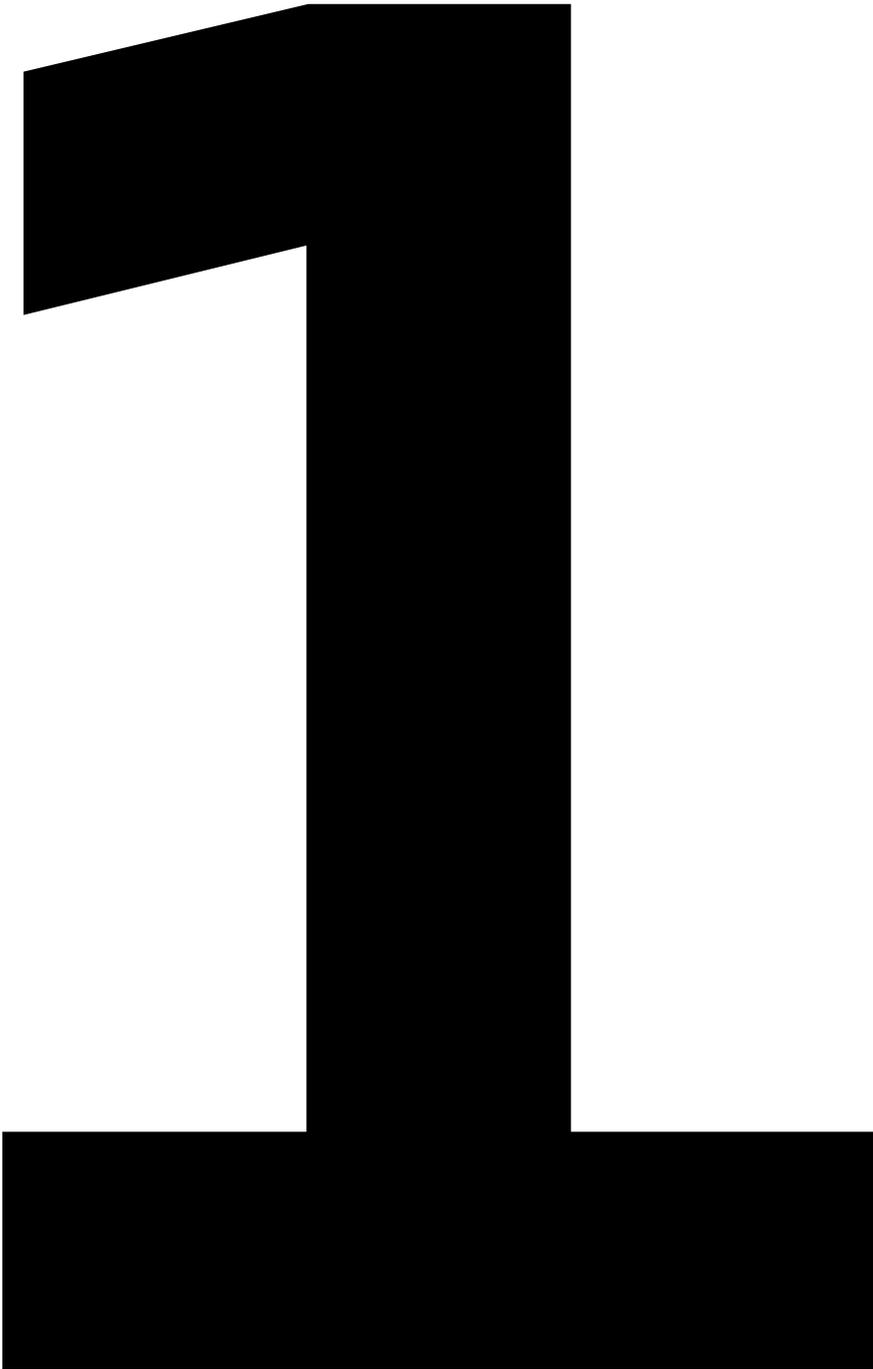
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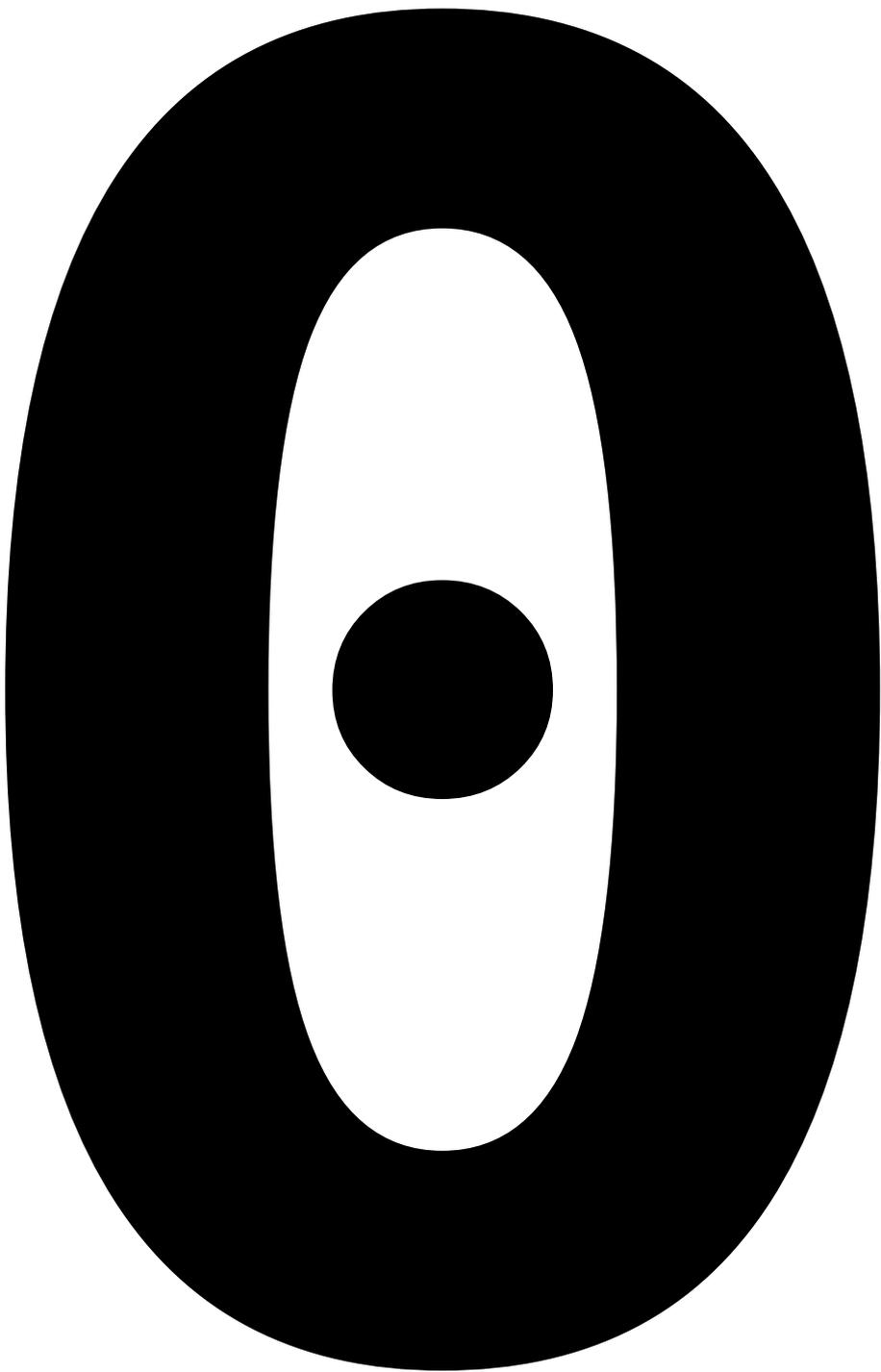
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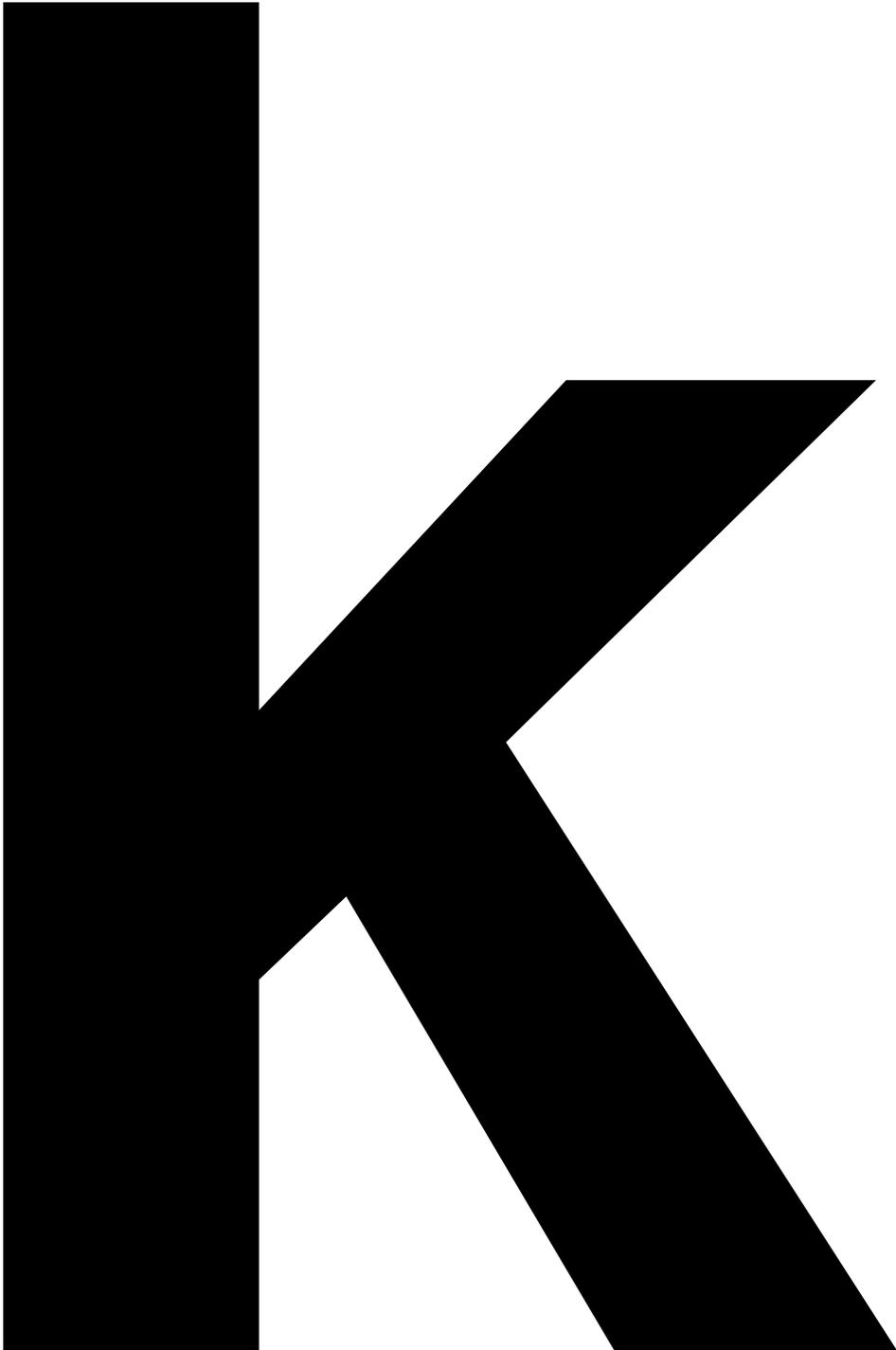
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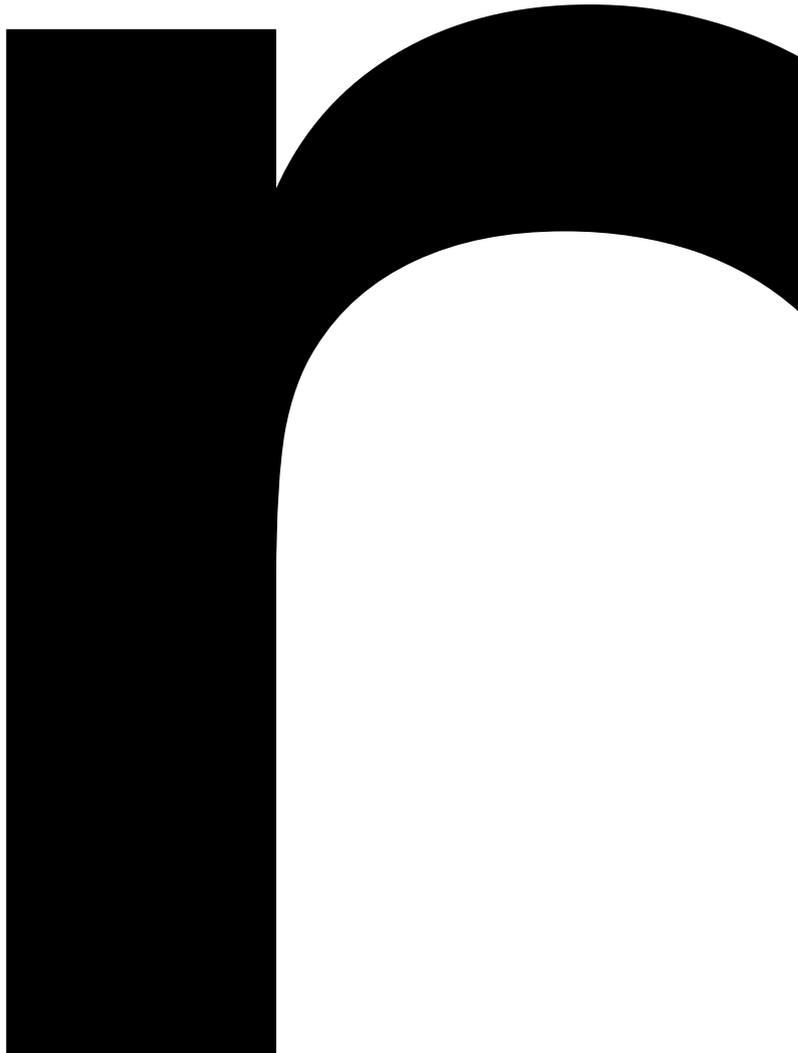


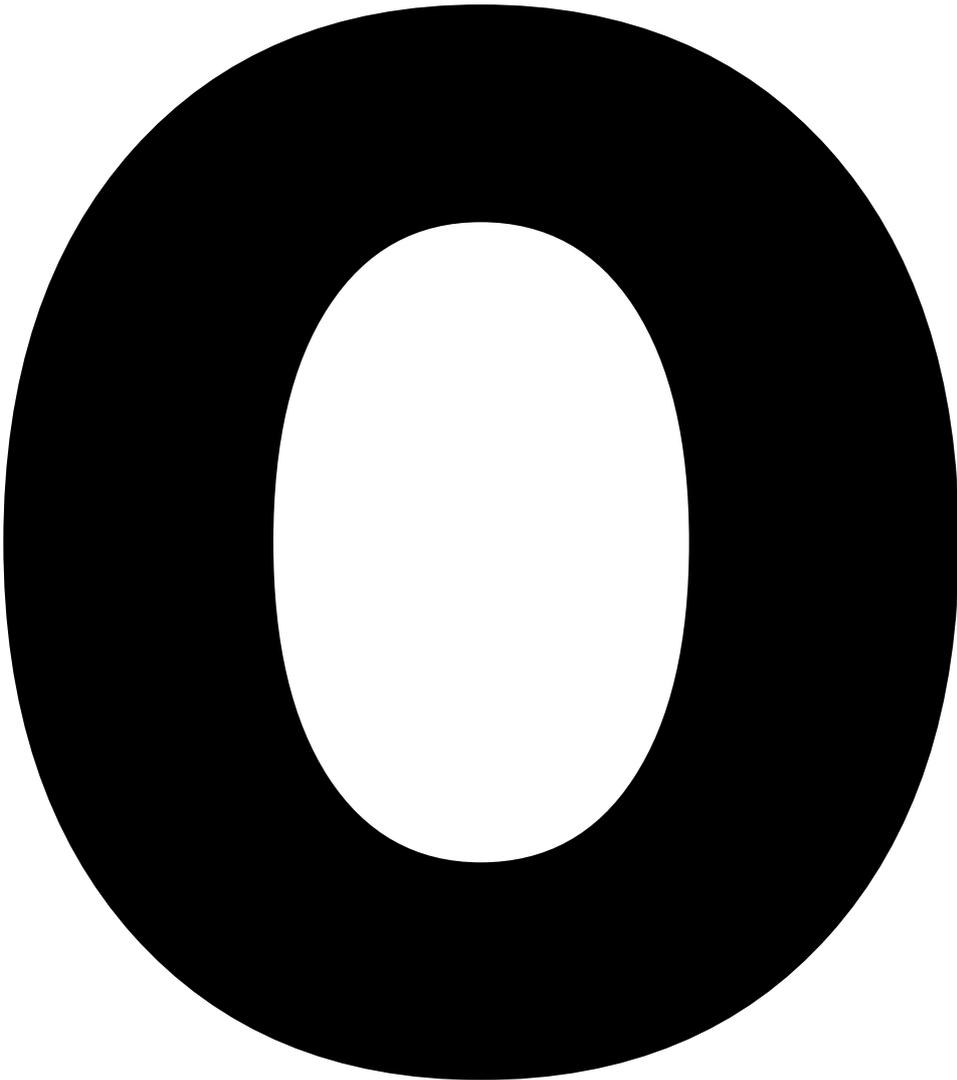


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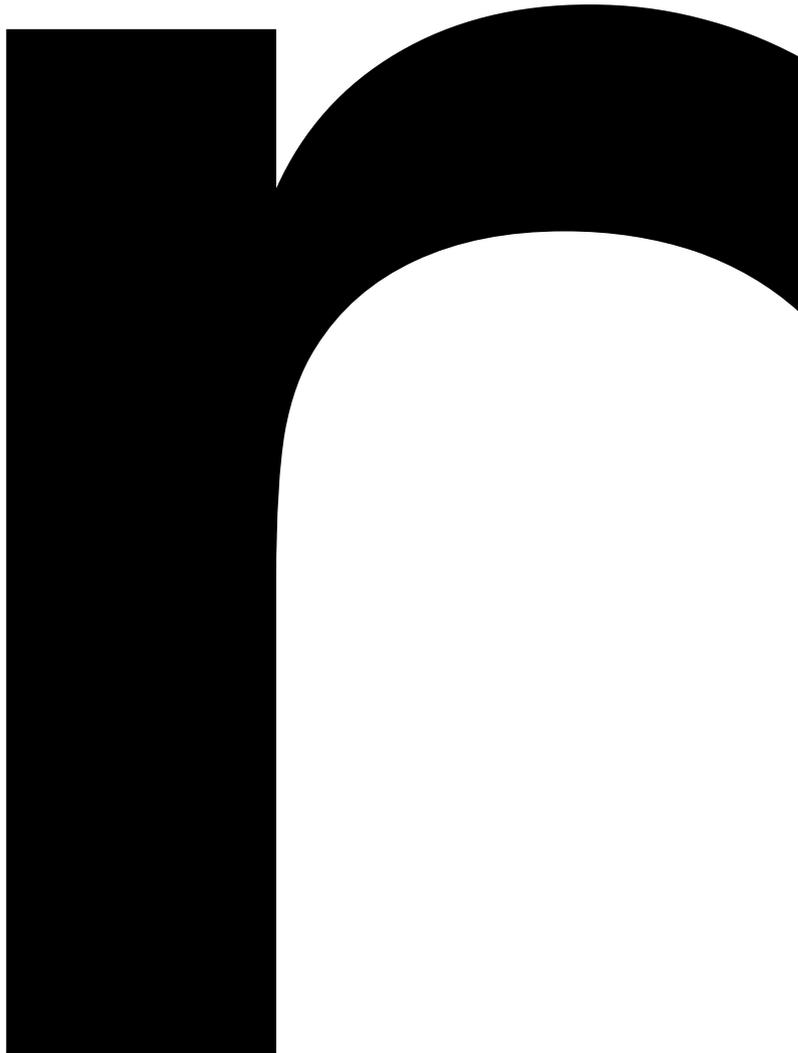
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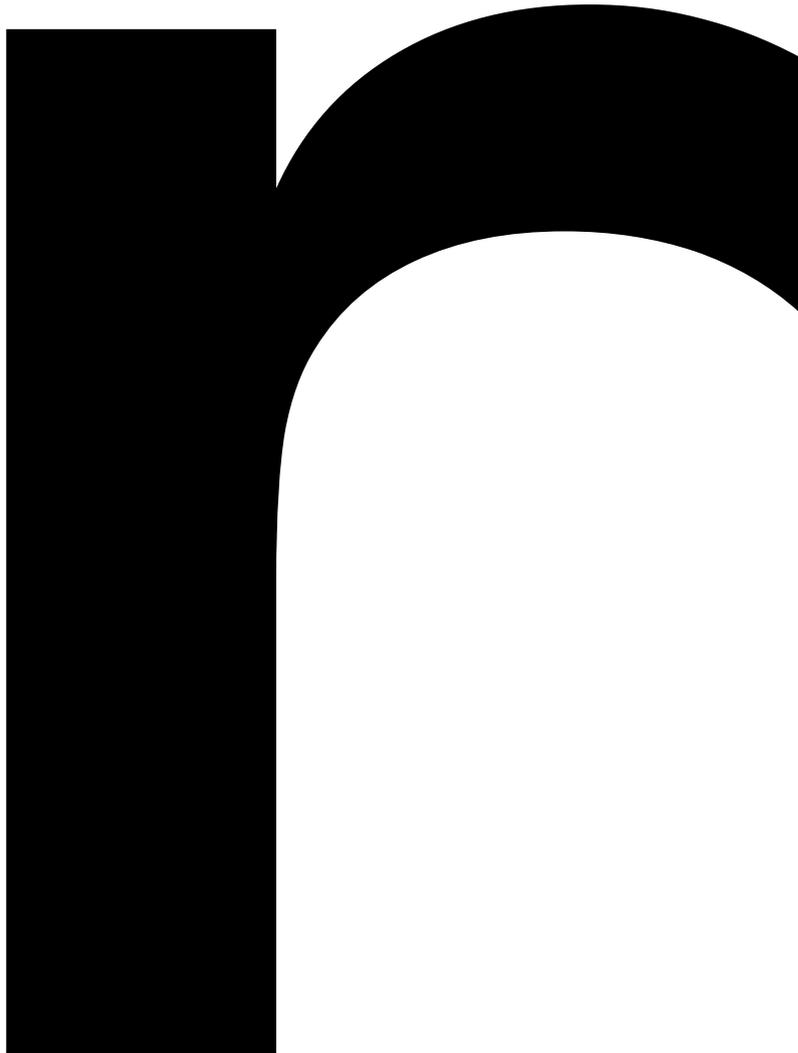
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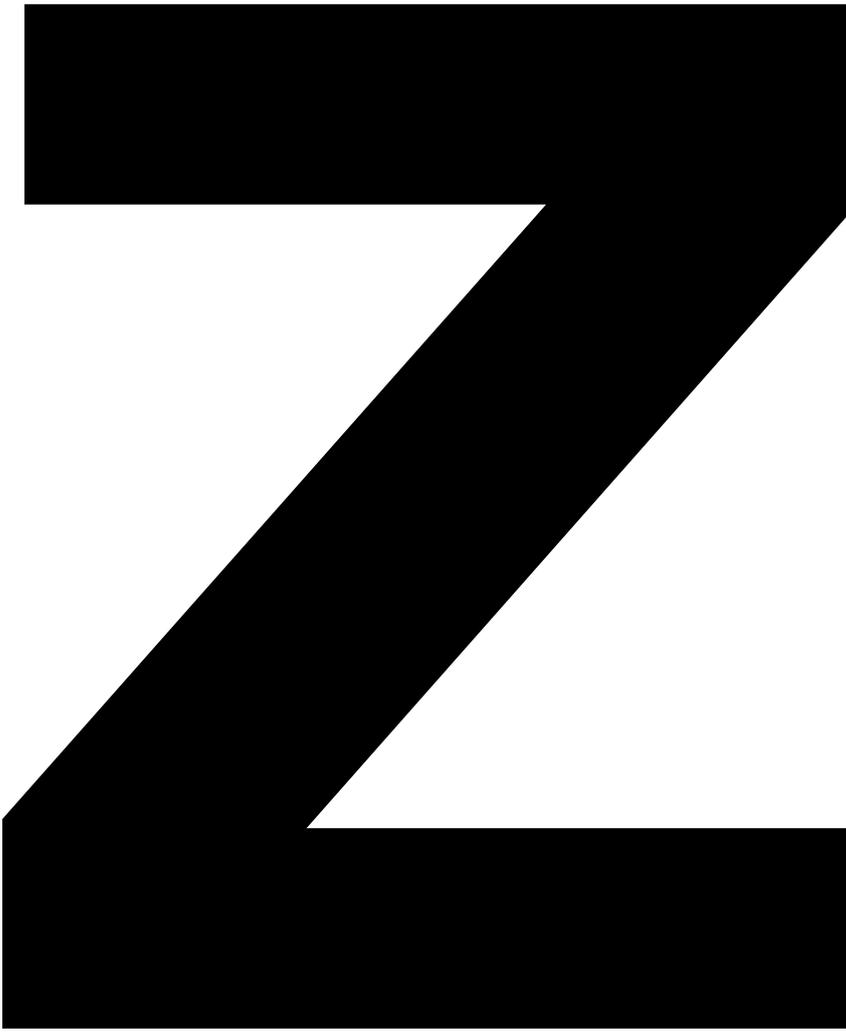


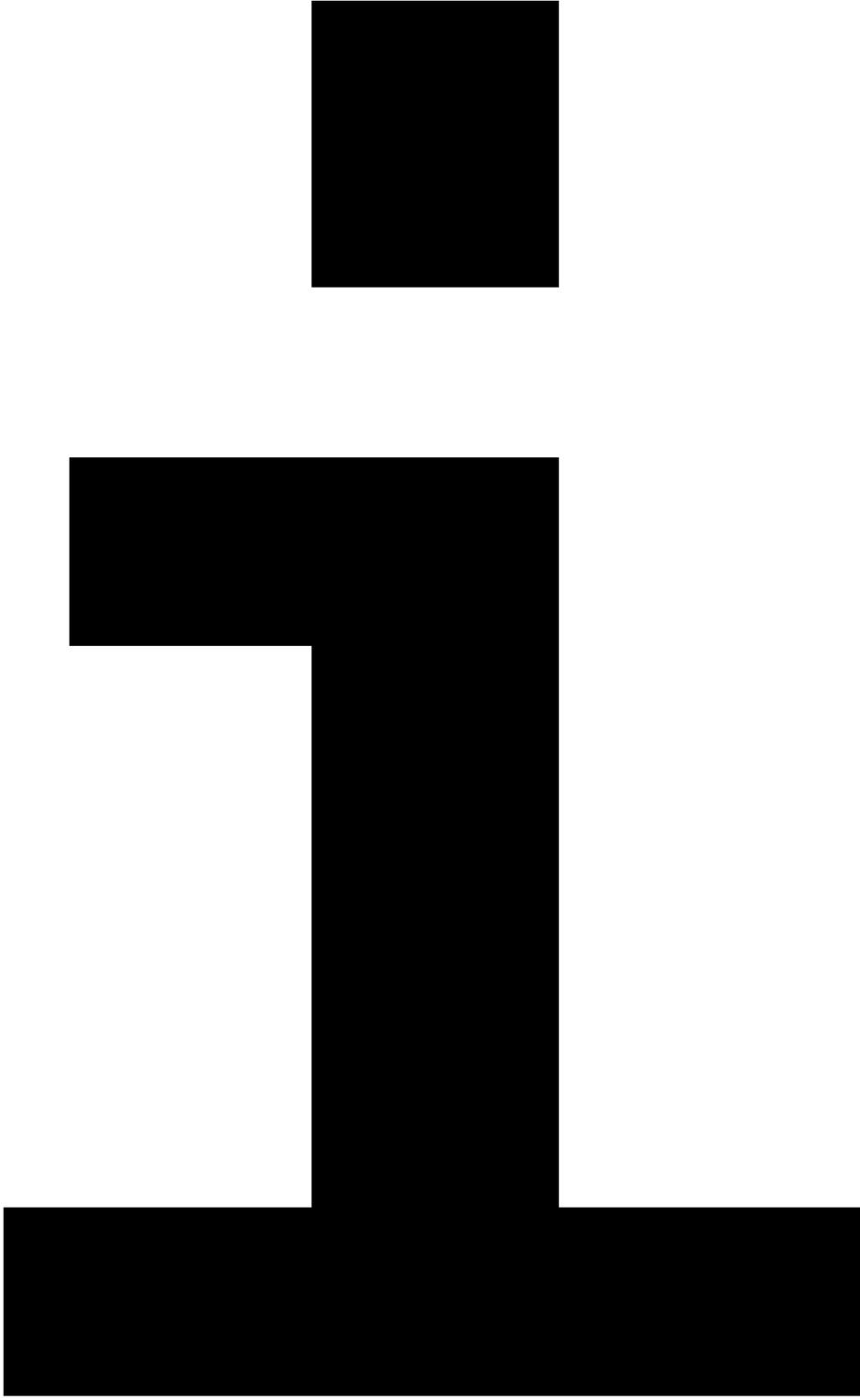


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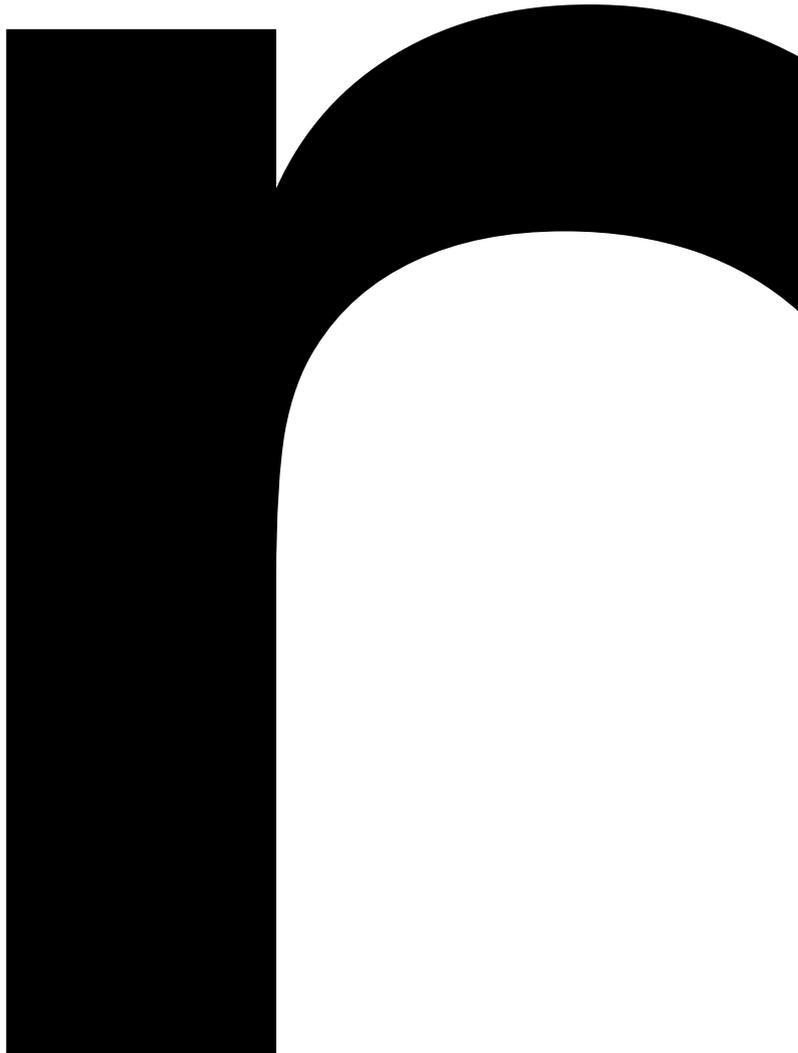
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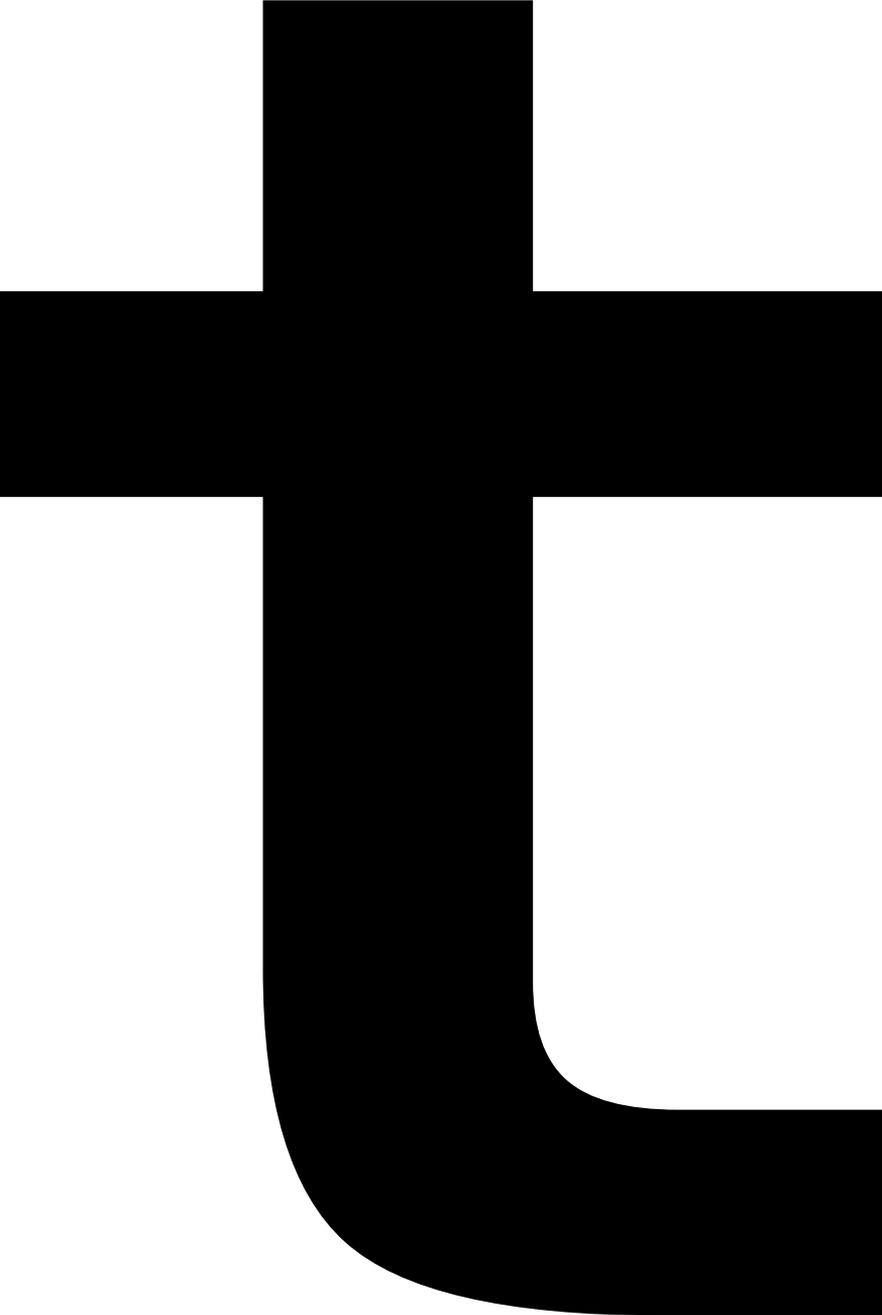
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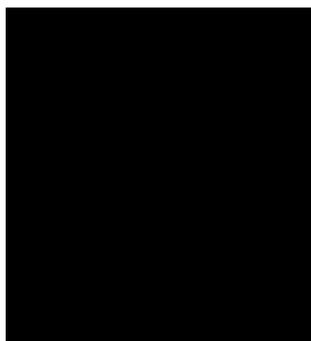




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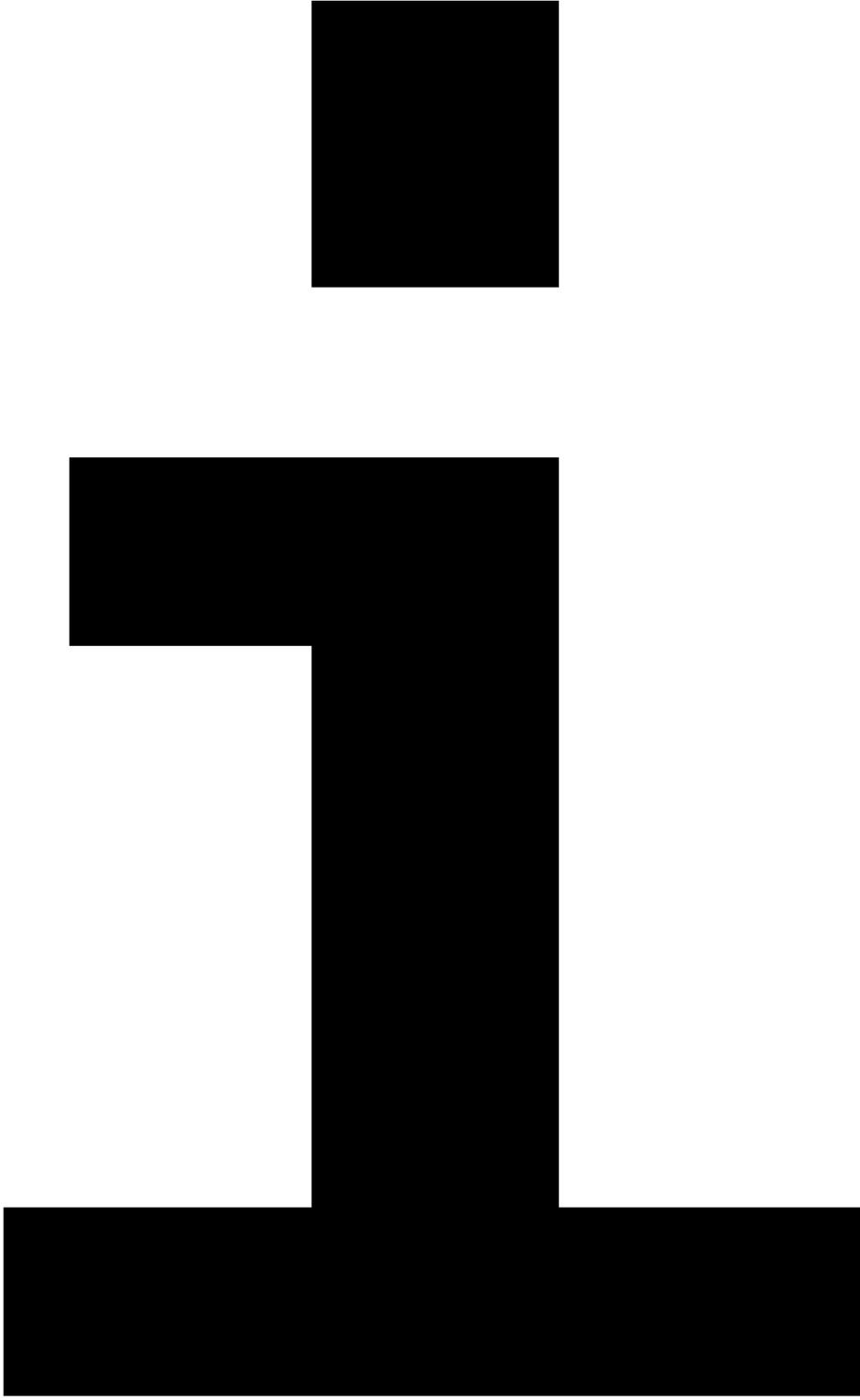
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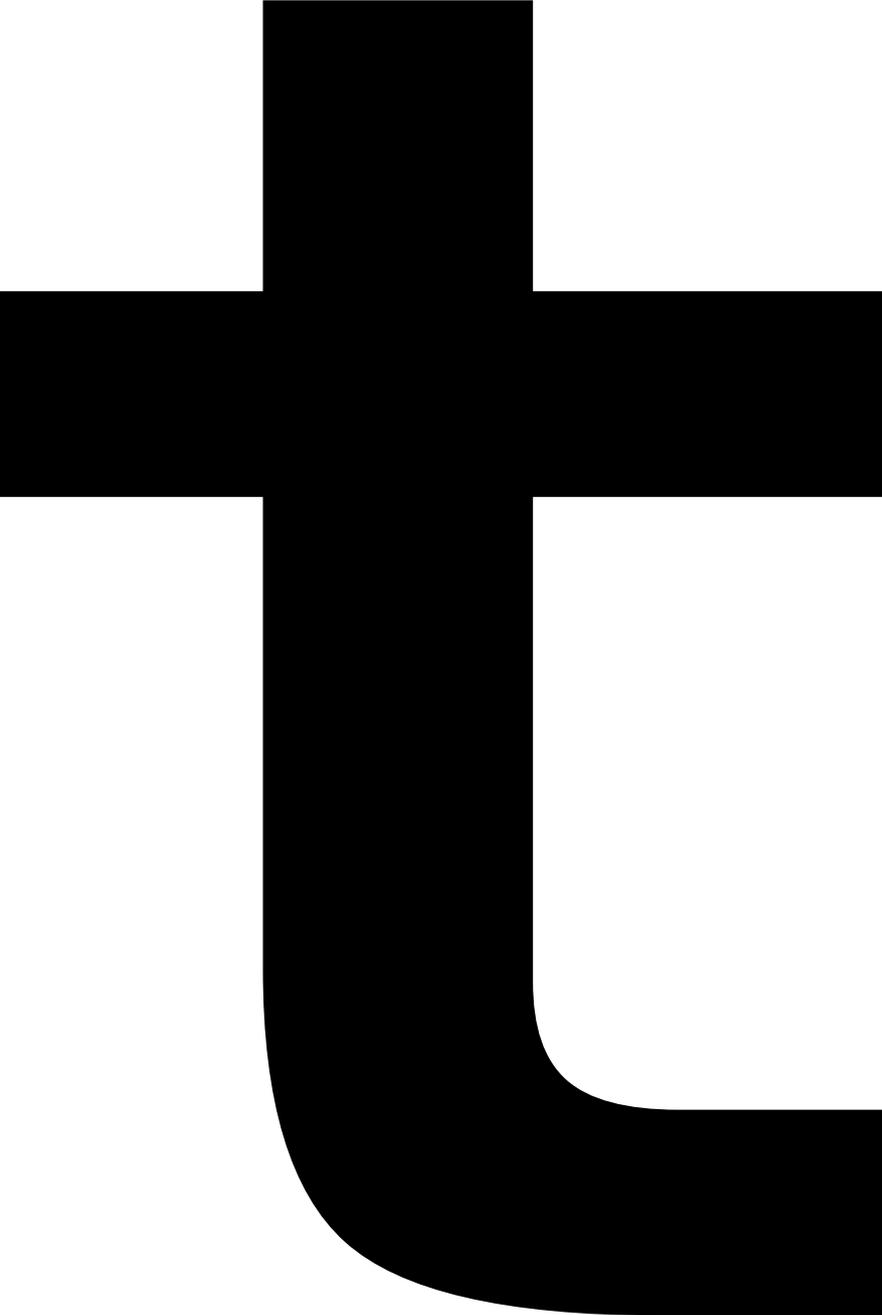
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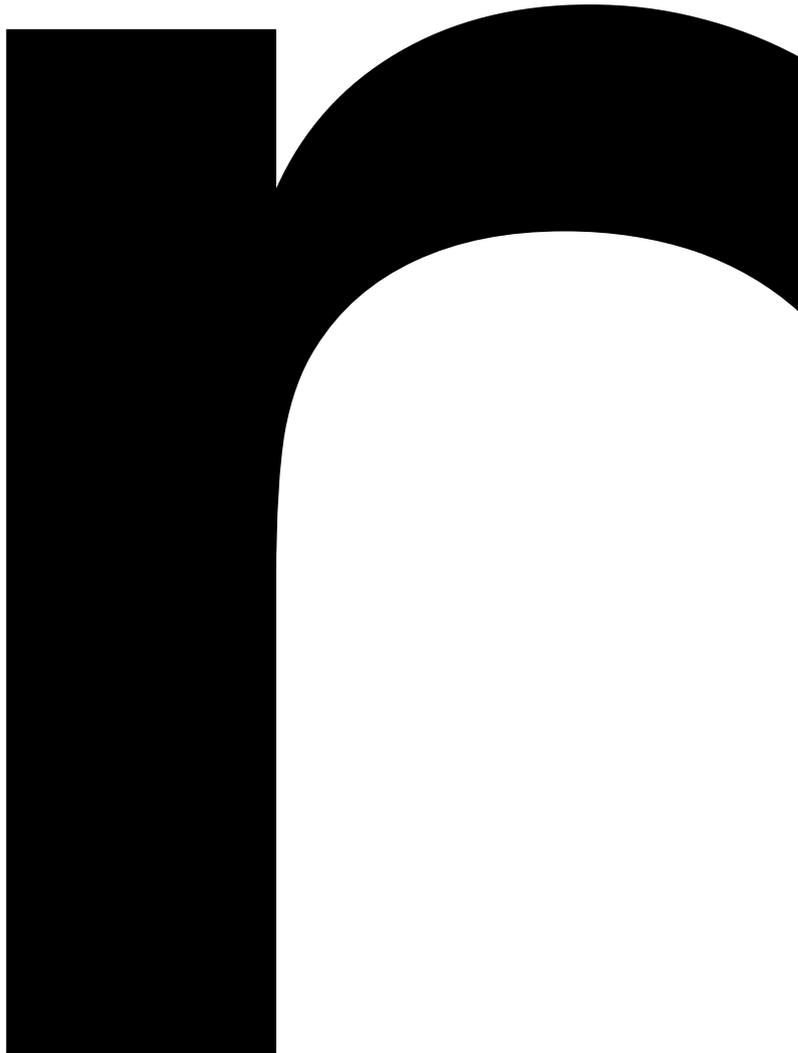
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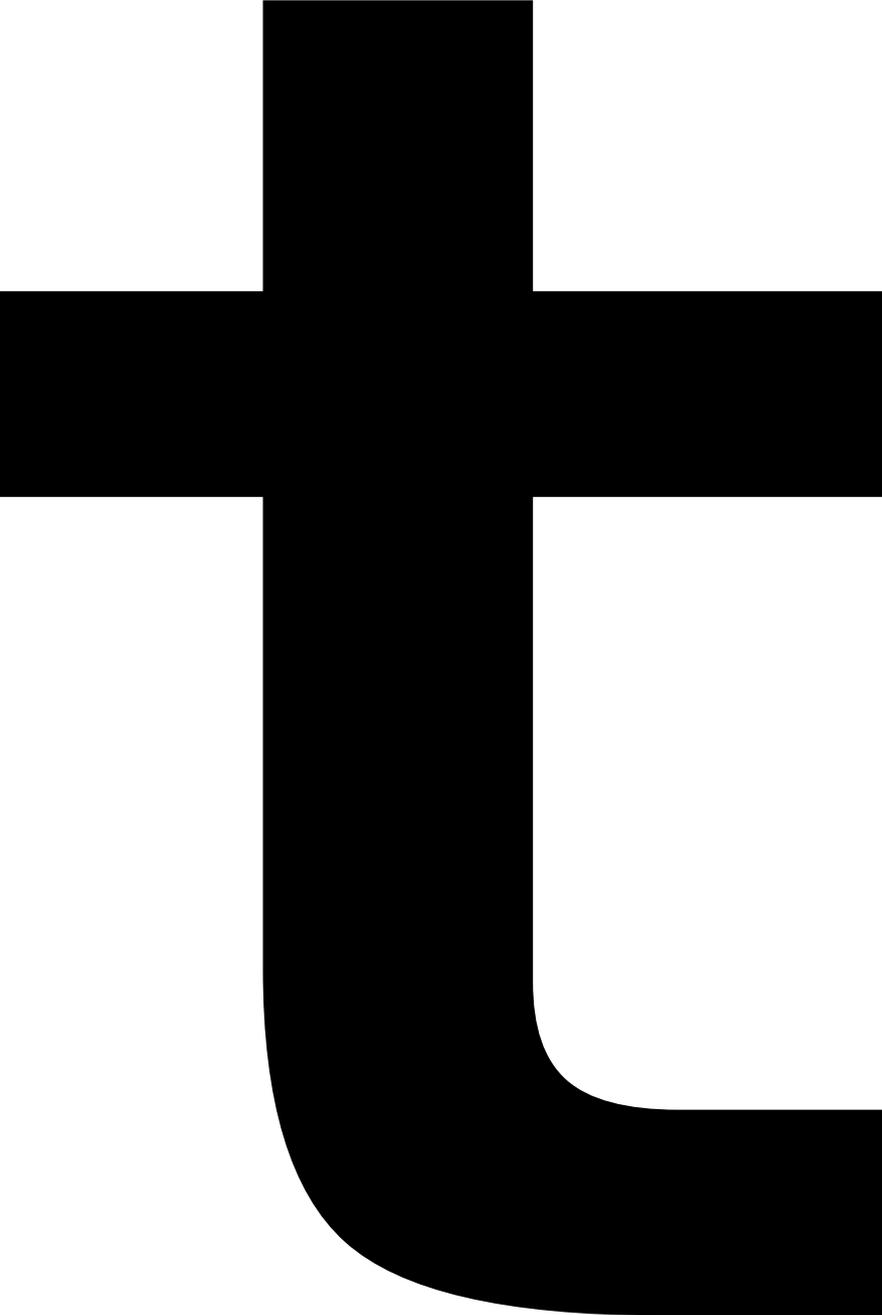
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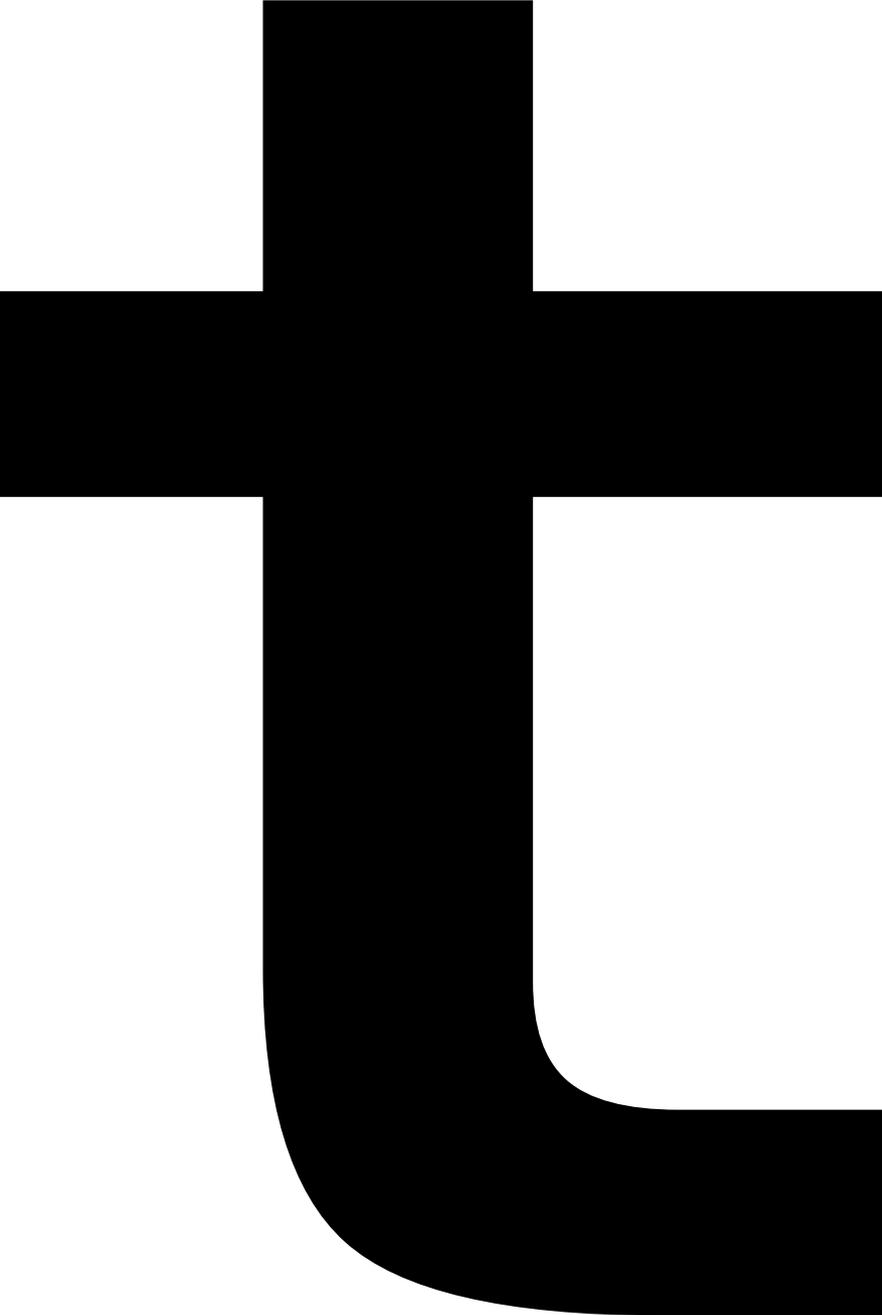
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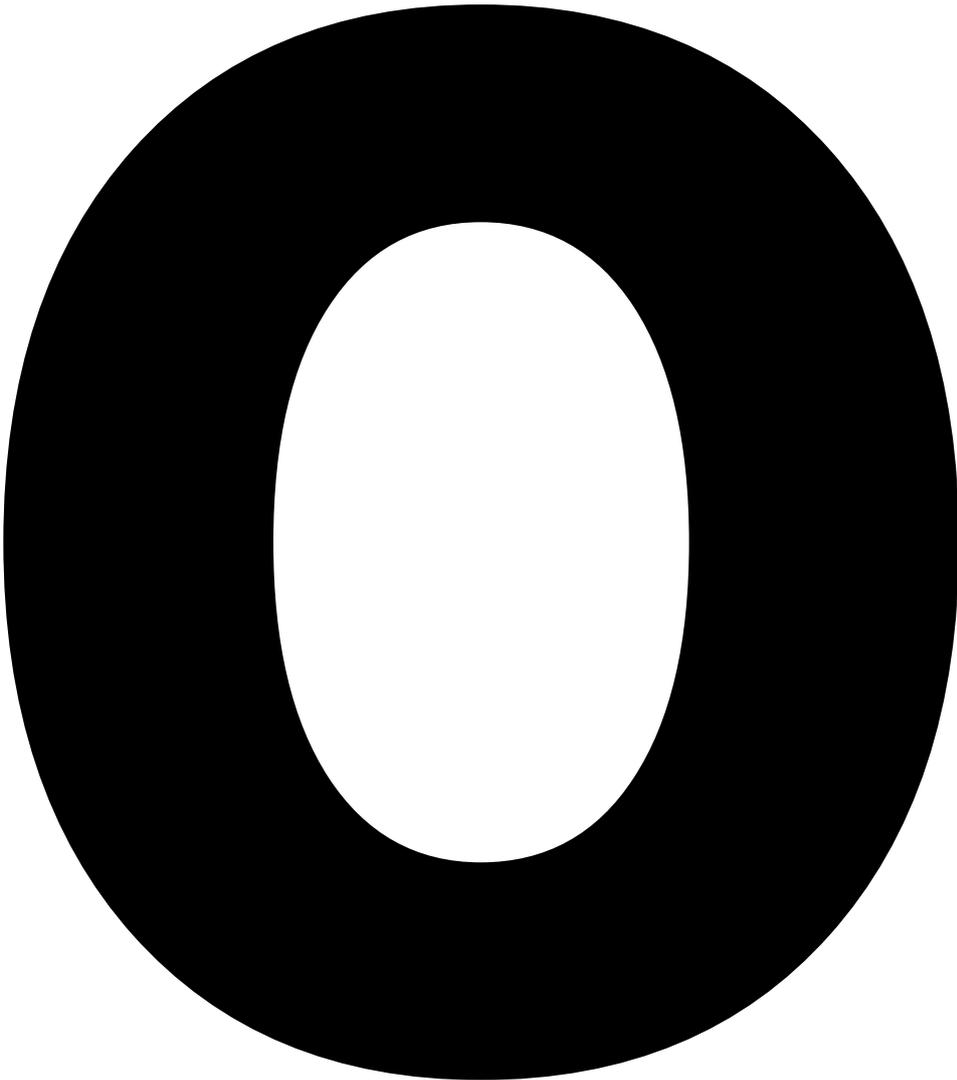


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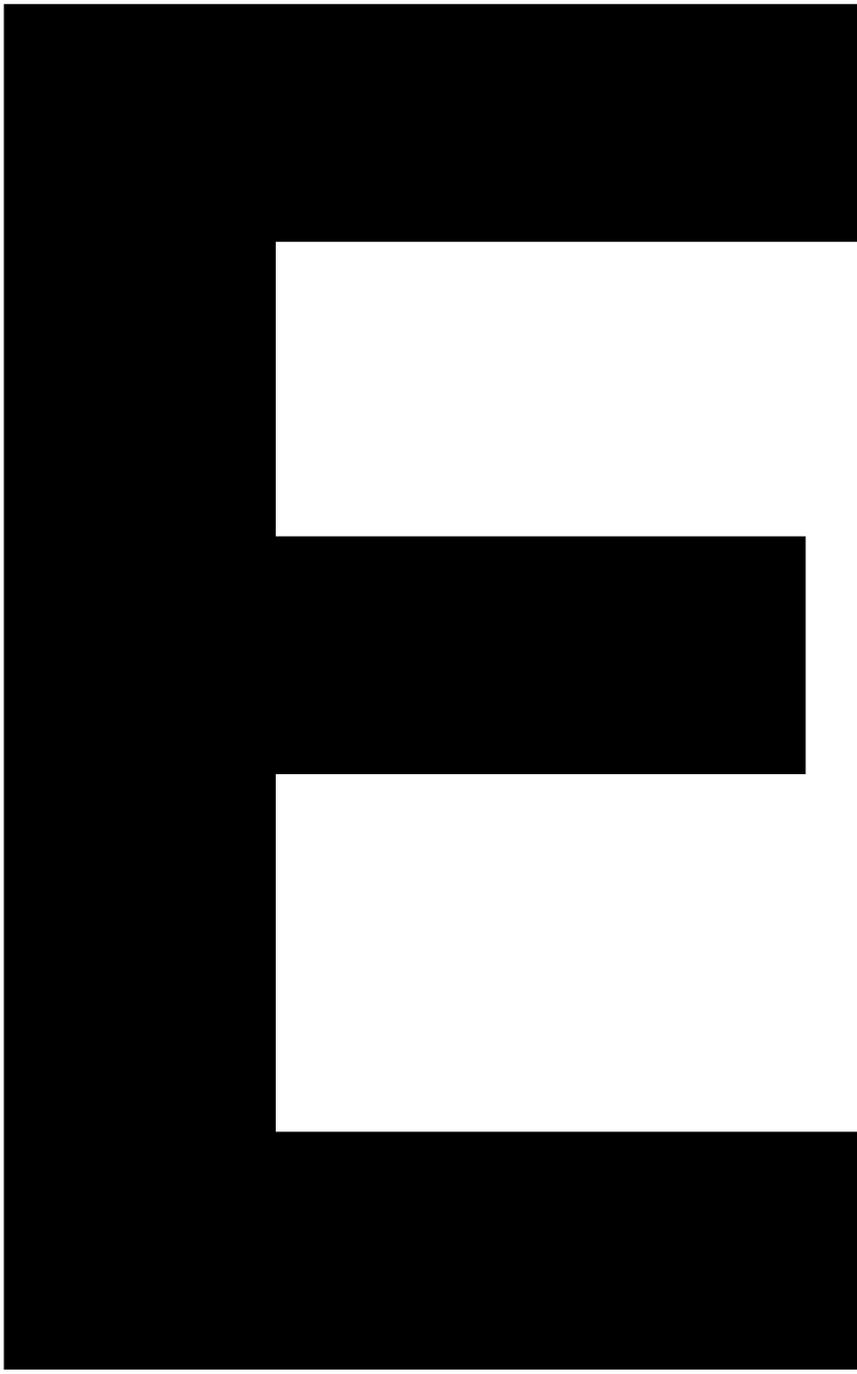
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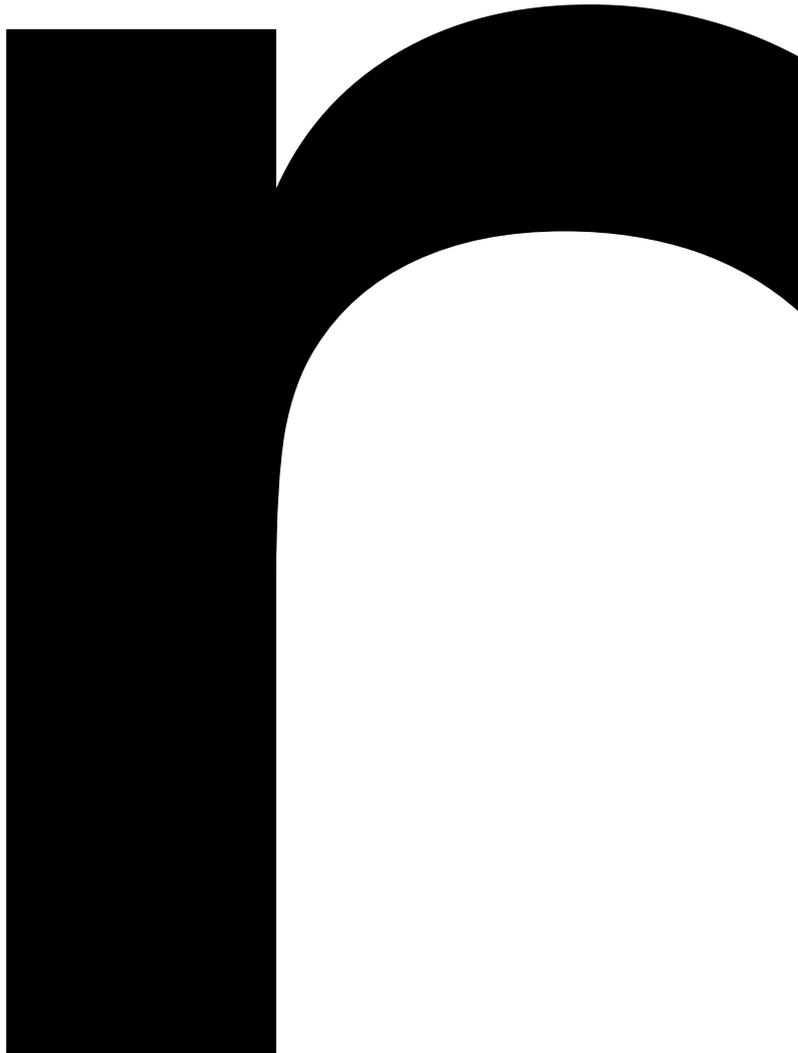


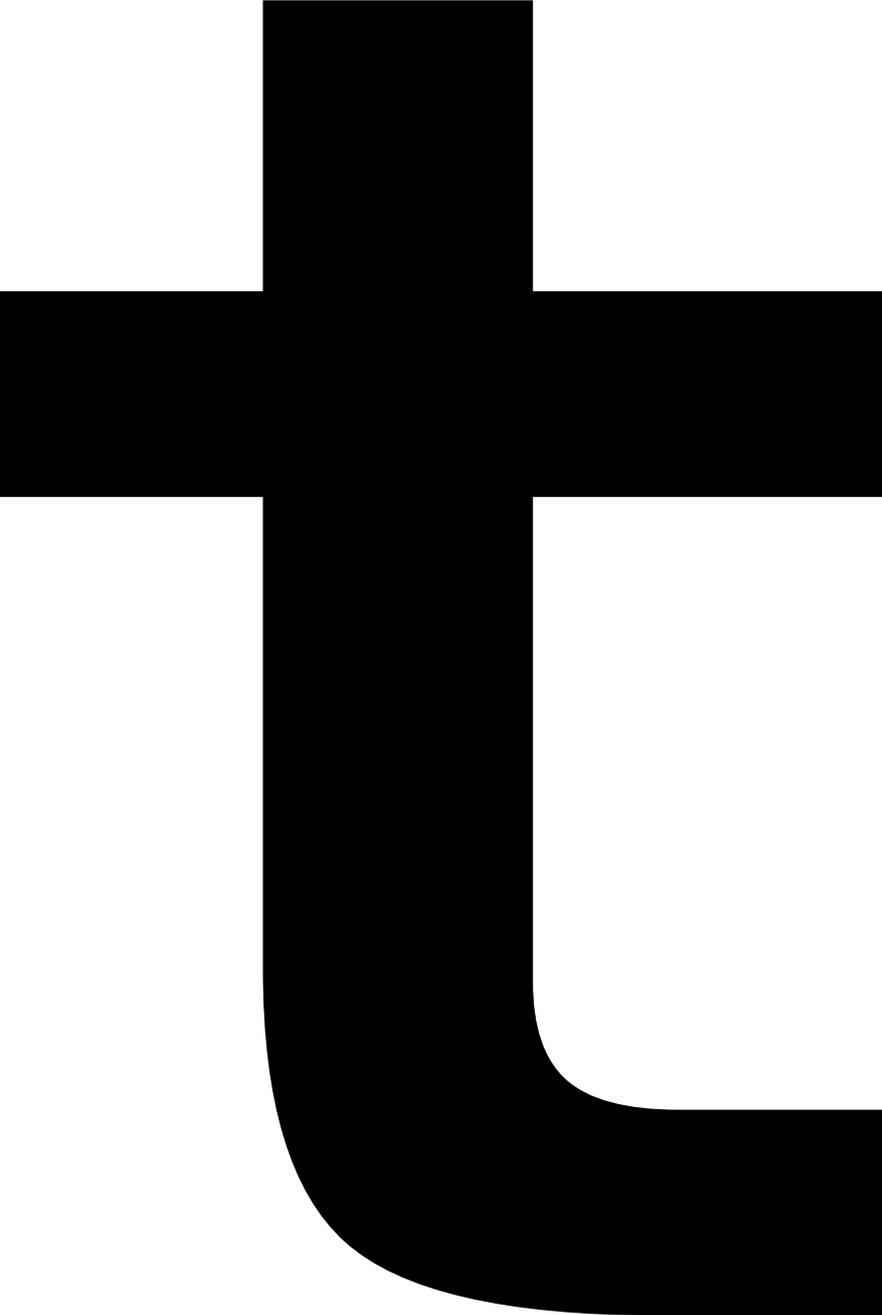


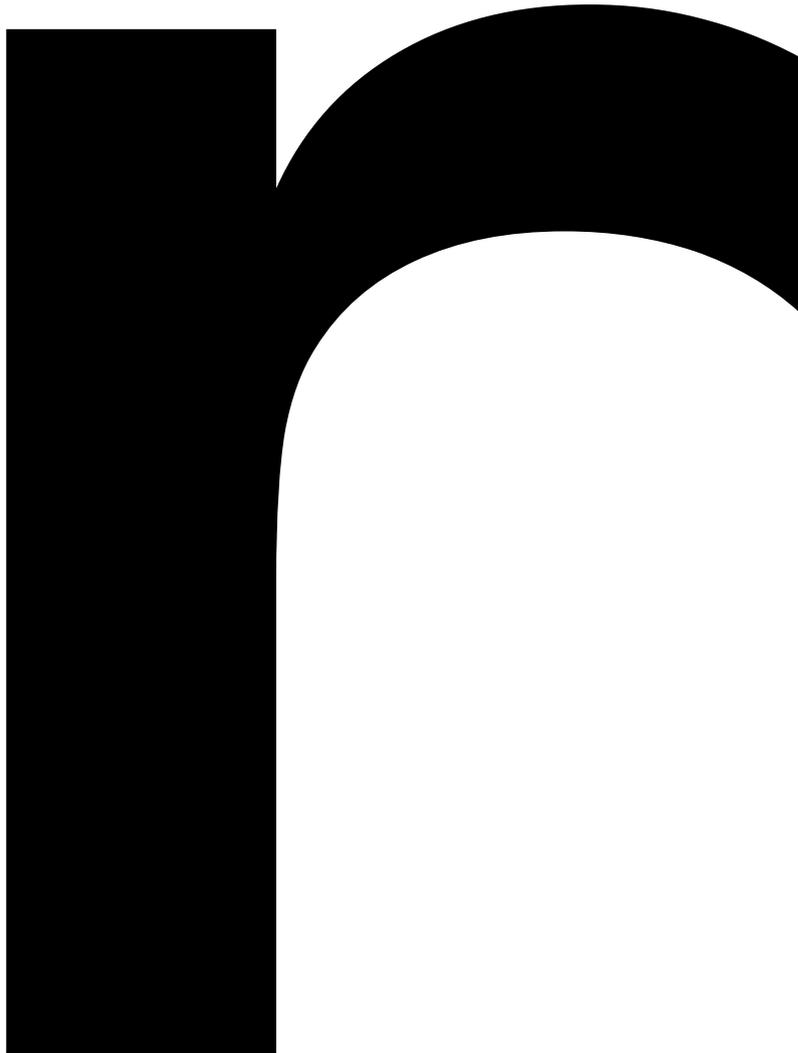








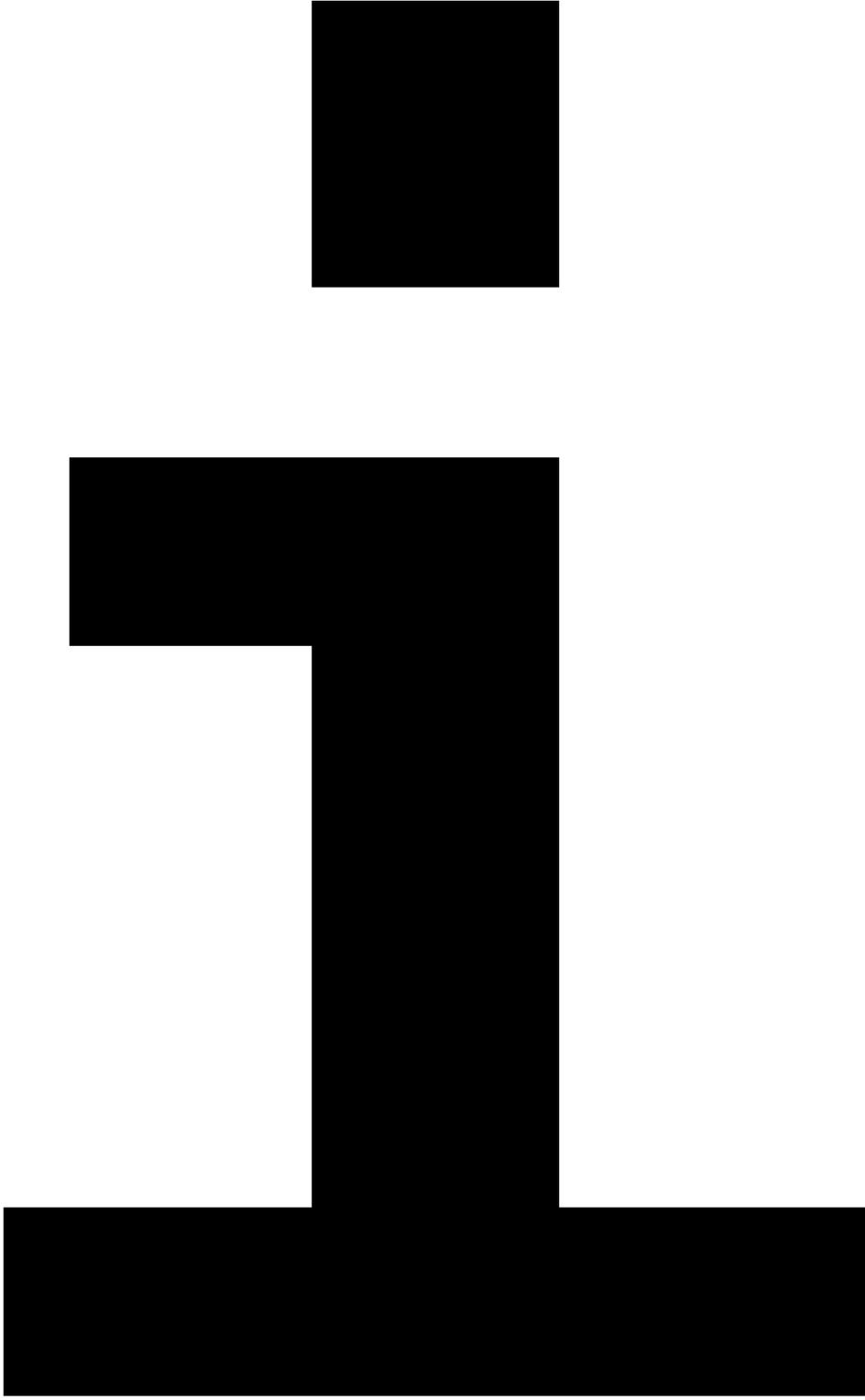




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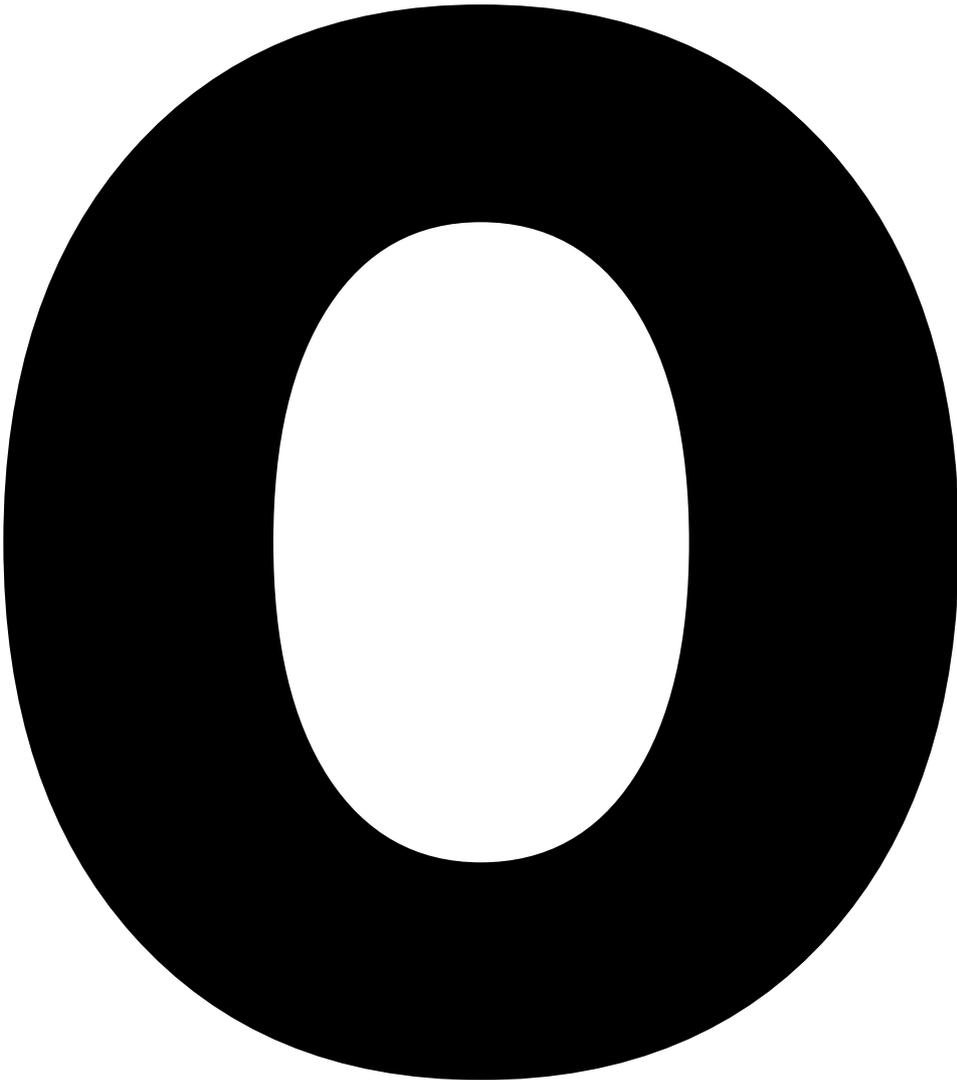


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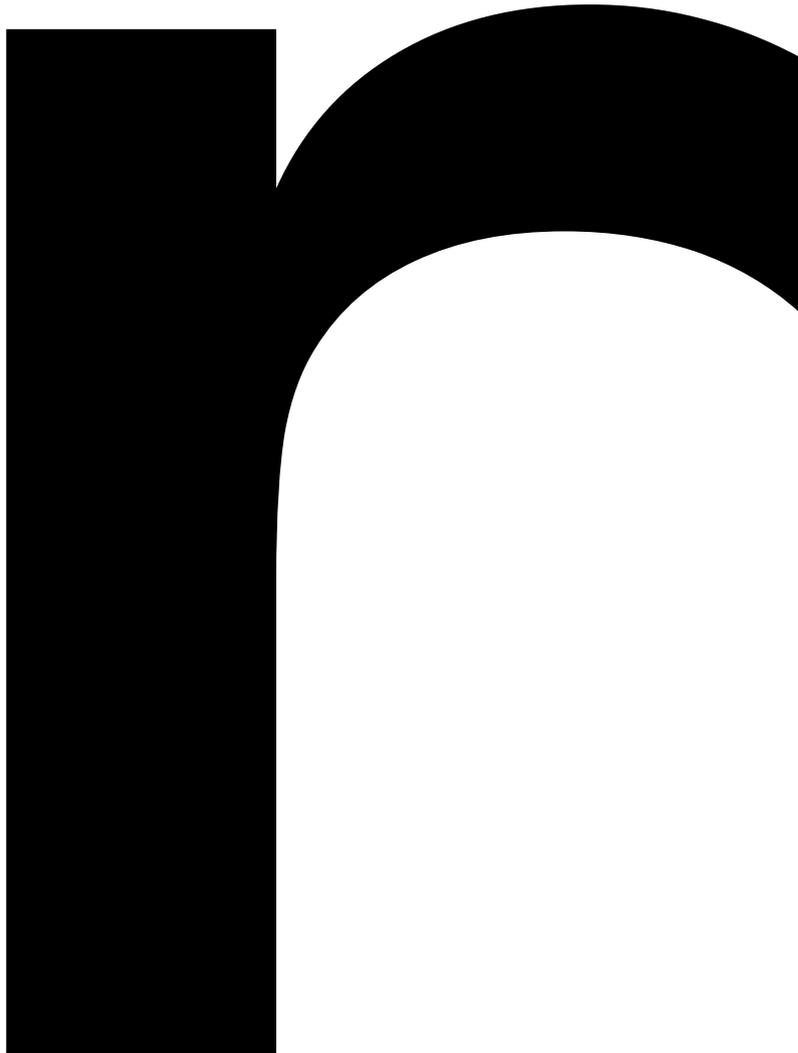
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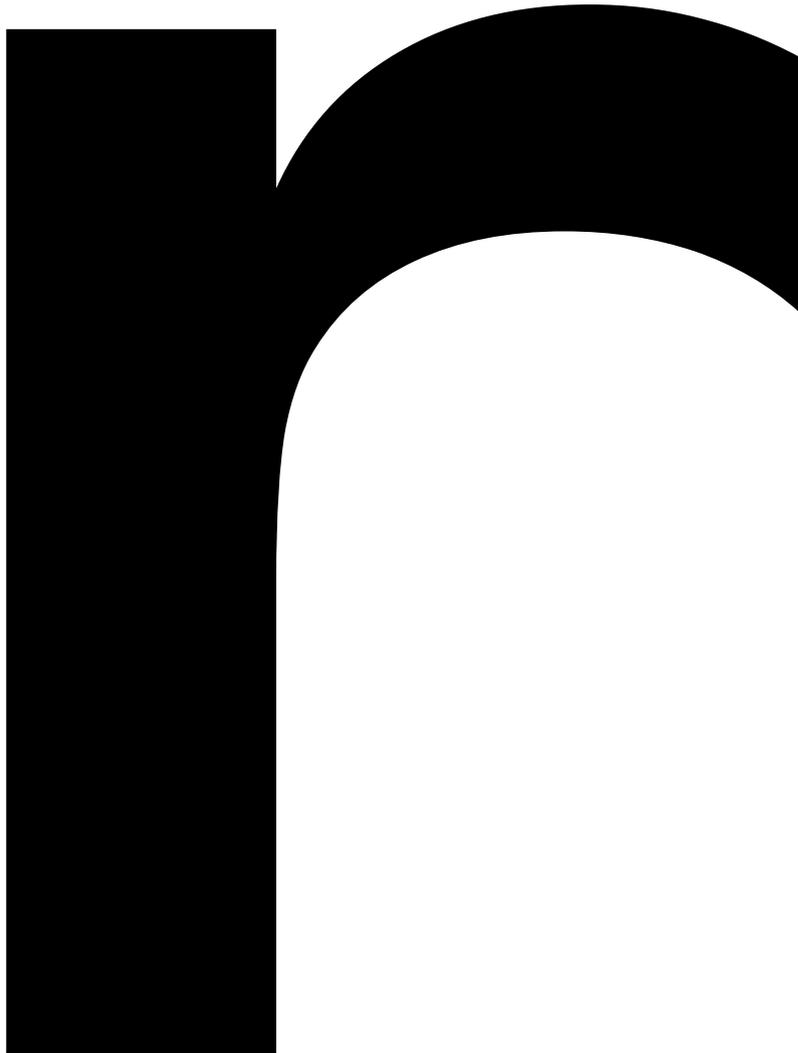
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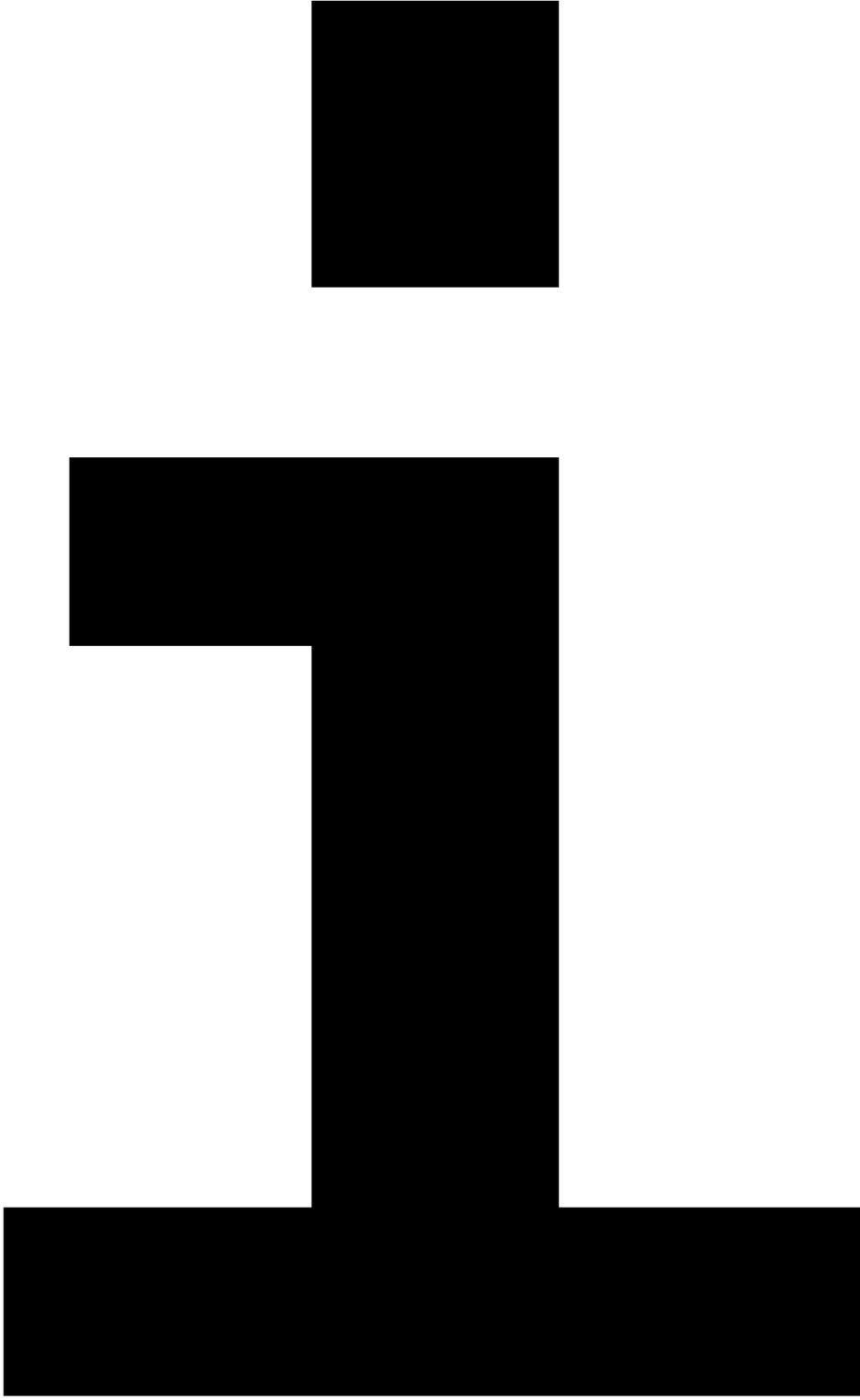
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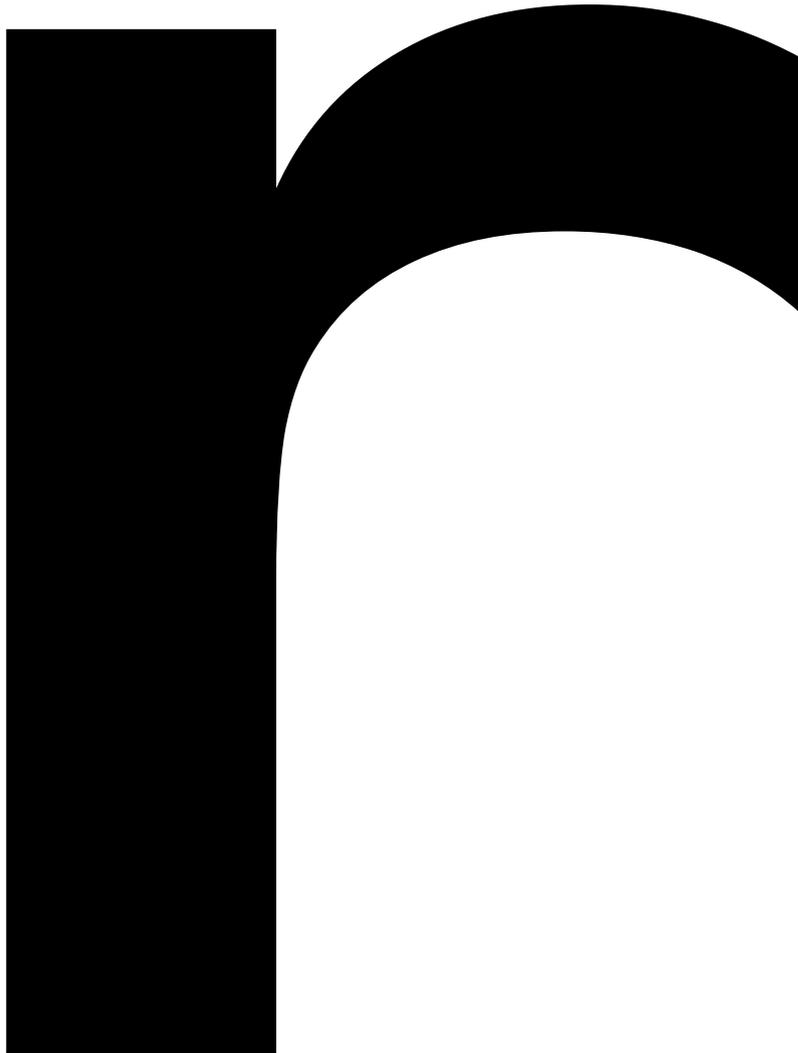
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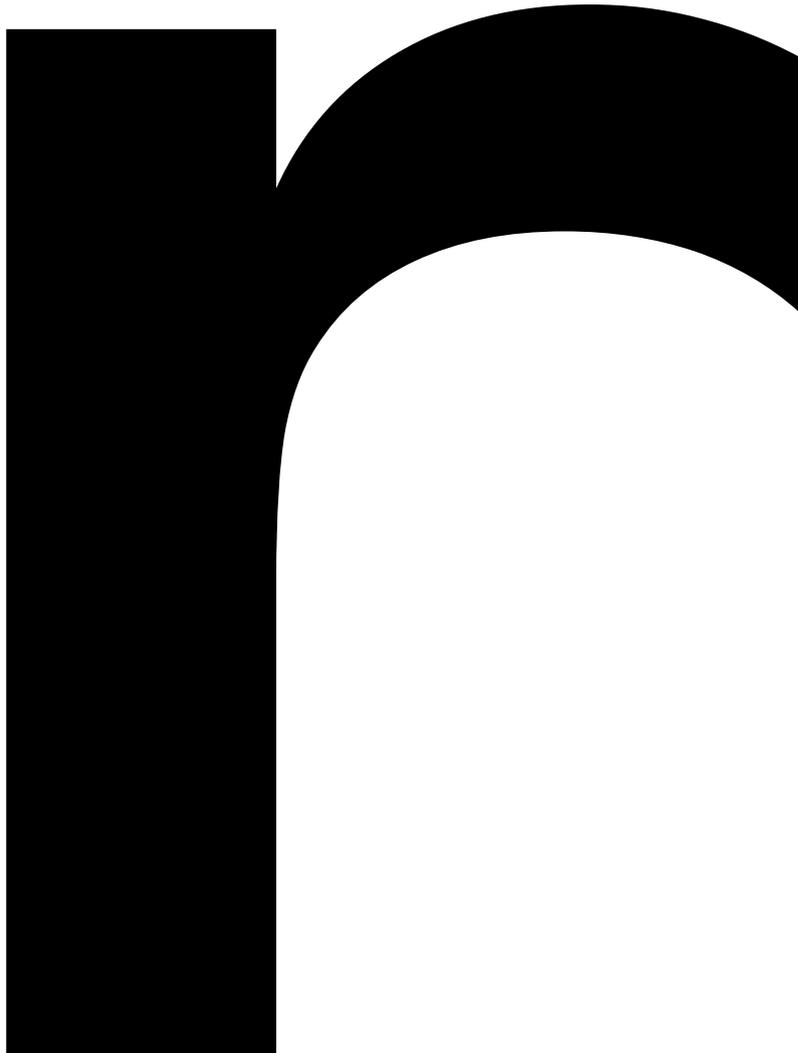
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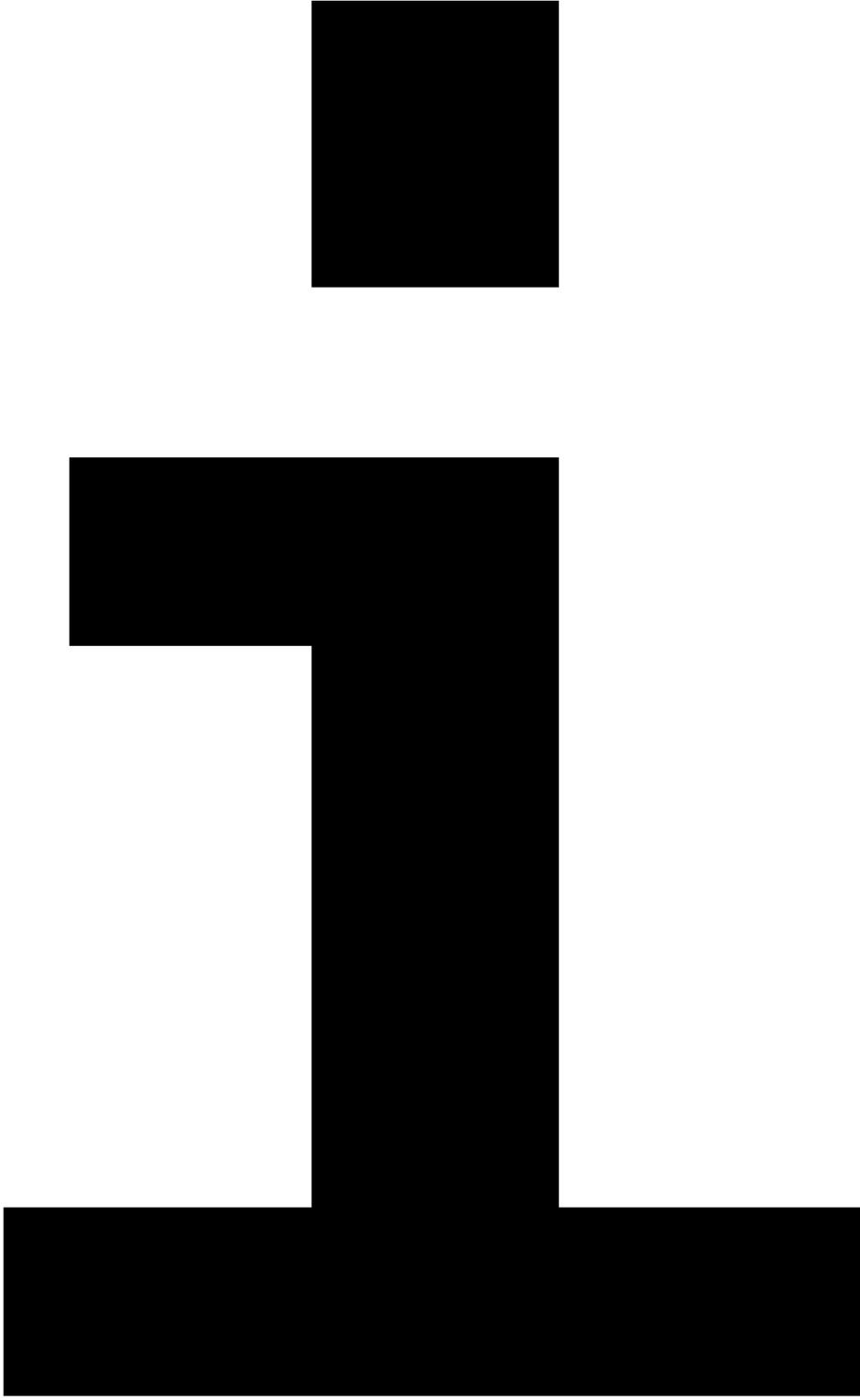
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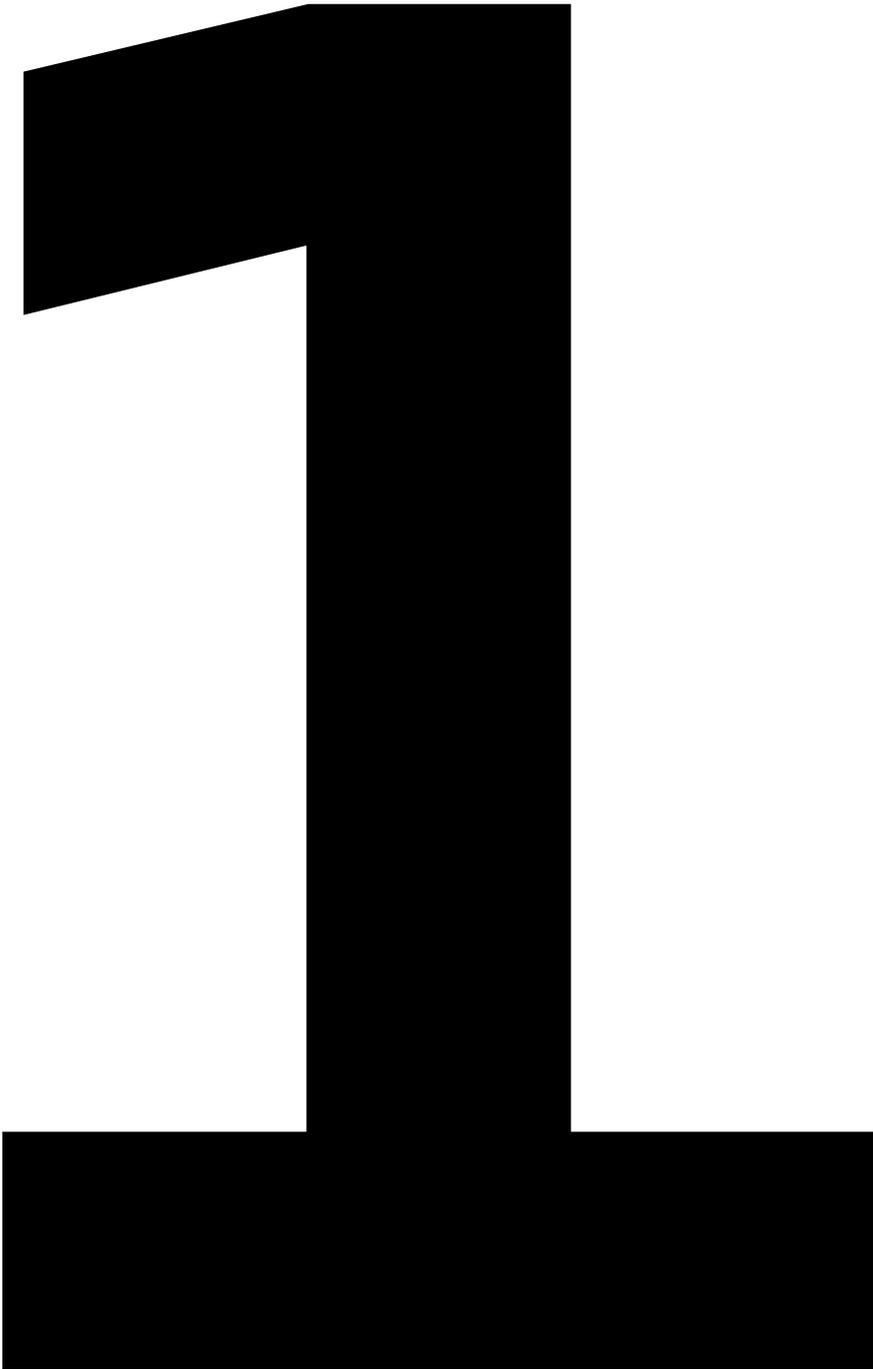
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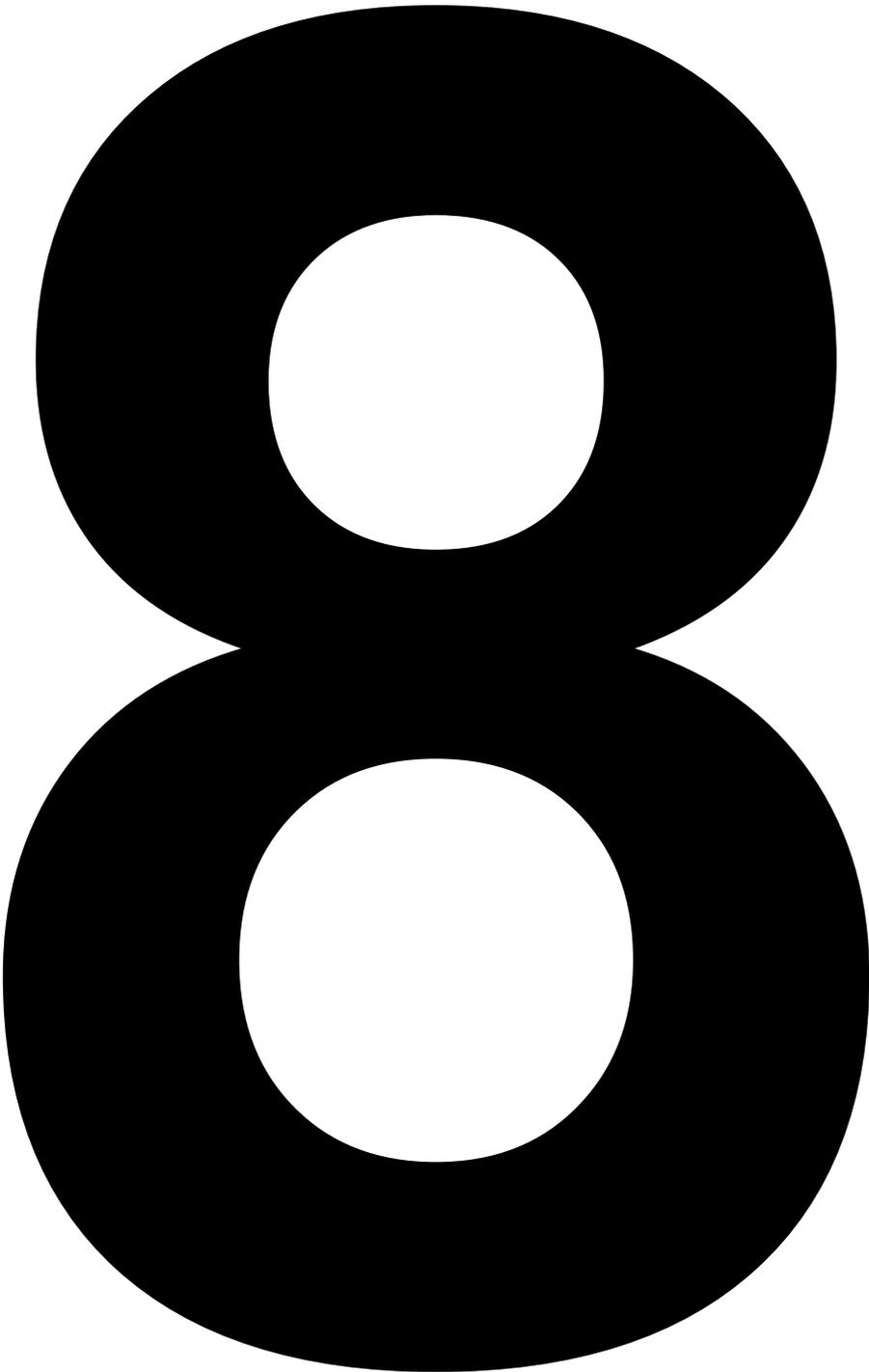


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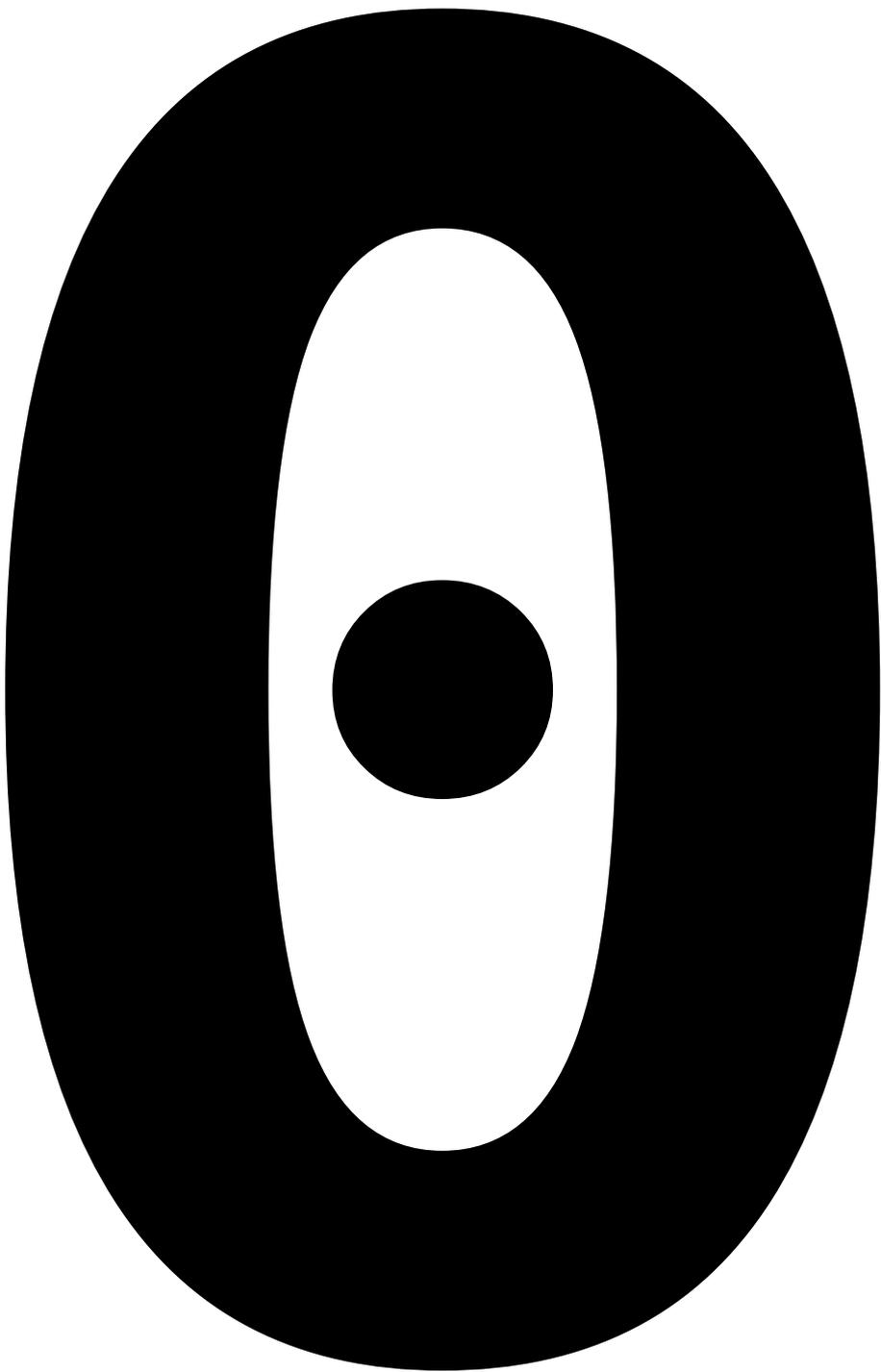
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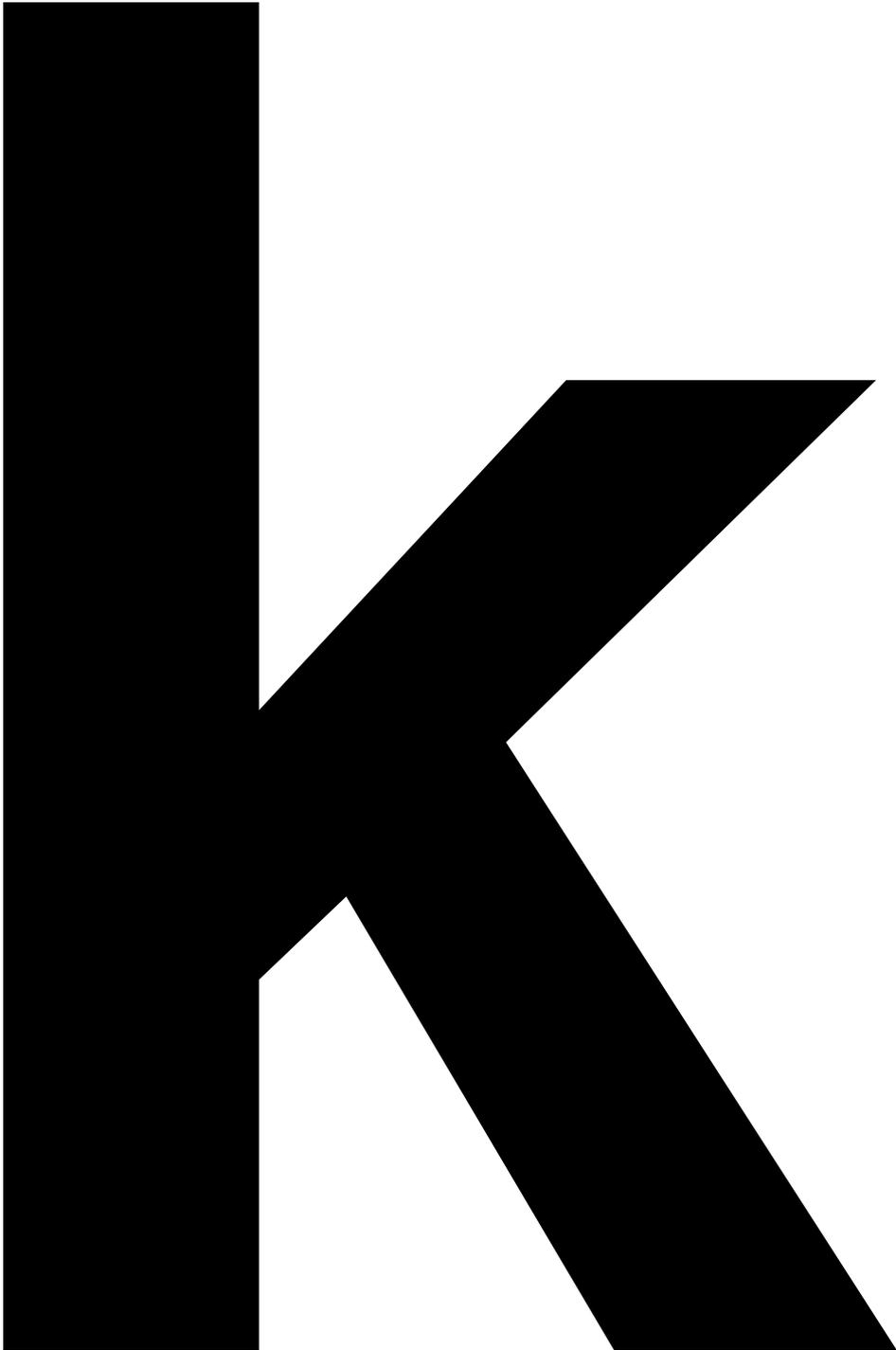






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