

Exponential Functions & Logarithms

Exponent Rules

$$\text{Ex. } 5^{-1} = \frac{1}{5}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$\frac{1 + 25}{5625} = \frac{5^3}{5^4} = 5^{-1}$$

$$\frac{2^5}{2^2} = \frac{\cancel{2} \cdot \cancel{2} \cdot \cancel{2} \cdot 2 \cdot 2}{\cancel{2} \cdot \cancel{2}}$$

$$\text{Ex. } 5^0 = 1$$

0^0 does not exist

$$\frac{5^4}{5^4} = 5^0 = 1$$

$$\begin{aligned} \text{Ex. } 4^{-3} &= (4^3)^{-1} \\ &= 64^{-1} \\ &= \frac{1}{64} \end{aligned}$$

$$(a^m)^n = a^{mn}$$

$$\text{Ex } 16^{1/4} = \sqrt[4]{16} = 2$$

↑
denominator is the
root index

$$\text{Ex. } 64^{1/3} = \sqrt[3]{64} = 4$$

$$\text{Ex. } 100^{1/2} = \sqrt{100} = 10$$

$$\text{Ex. } 8^{5/3} = \left(\sqrt[3]{8}\right)^5$$

$$= 2^5$$

$$= 32$$

$$\sqrt[3]{8^5} \checkmark$$

EX. $4^{3/2} = (\sqrt{4})^3$
 $= 2^3$
 $= 8$

(OR) $4^{3/2} = \sqrt{4^3} = \sqrt{64} = 8$

EX. $27^{-2/3}$
 $= \left((27^{1/3})^2 \right)^{-1}$
 $= (3^2)^{-1}$
 $= 9^{-1}$
 $= \frac{1}{9}$

$$\begin{aligned}
 \text{Ex. } 32^{-4/5} &= \left(\sqrt[5]{32}\right)^{-4} \\
 &= 2^{-4} \\
 &= 16^{-1} \\
 &= \frac{1}{16}
 \end{aligned}$$

Exponential Functions

$$y = b^x, \quad b > 0, \quad b \neq 1$$

\uparrow
 $b = \text{base}$

Ex. $y = 5^x$

Ex. $y = \left(\frac{2}{3}\right)^{5x-3}$

Ex. $y = e^x$ ↳ The Euler number

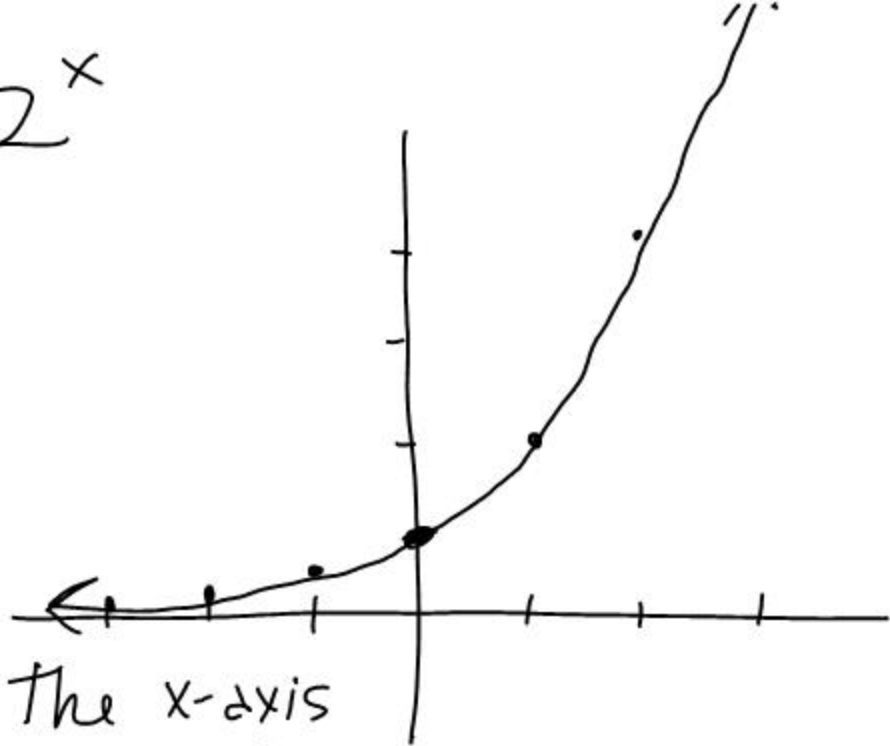
~~$y = (-4)^x$~~
 ~~$(-4)^{1/2}$~~

~~$y = 0^x = 0$~~

~~$y = 1^x = 1$~~

Sketch $y = 2^x$

x	2^x
-3	$2^{-3} = 1/8$
-2	$2^{-2} = 1/4$
-1	$2^{-1} = 1/2$
$\rightarrow 0$	$2^0 = 1$
1	$2^1 = 2$
2	$2^2 = 4$
3	$2^3 = 8$



The x-axis
is a H.A.

