

4.1/4.2 Graphs of Exponential Functions



Exponential Functions

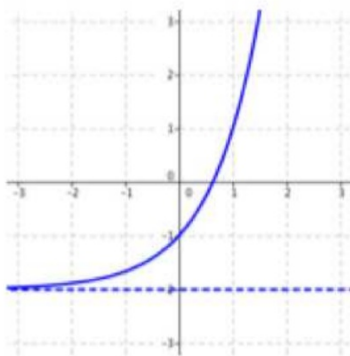
$$f(x) = ab^x$$

$$a \neq 0, \quad b > 0, \quad b \neq 1$$

b is called the growth or decay factor

Graphs of Exponential Functions

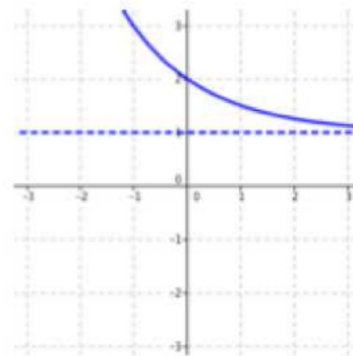
$$f(x) = ab^x$$



Exponential Growth

$$b > 1$$

*the RIGHT side of the graph moves AWAY from the asymptote



Exponential Decay

$$0 < b < 1$$

*the RIGHT side of the graph moves TOWARDS the asymptote

ex: Sketch. Then state the domain and range and classify as growth or decay.

a) $y = 2 \cdot 3^{x-1} + 4$

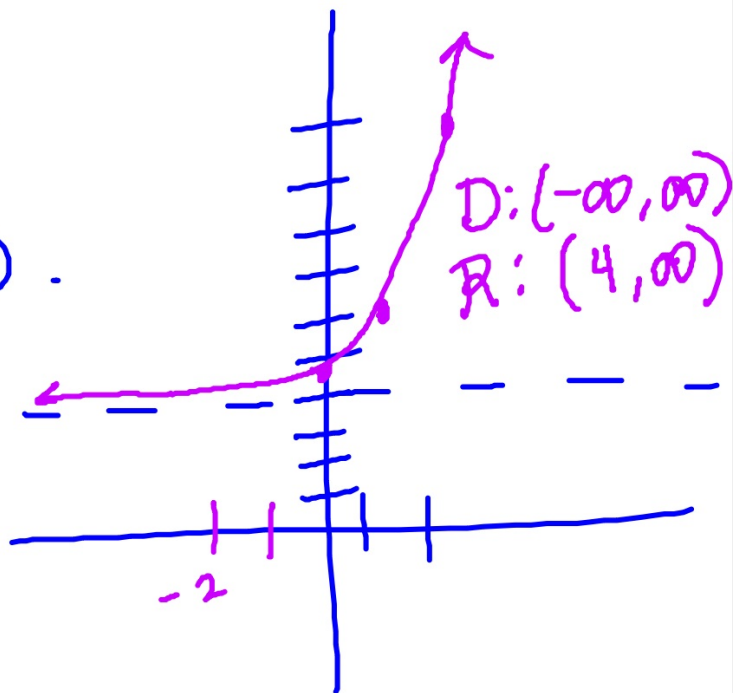
← asymptote

$b = 3$
growth

Asymptote: $y = 4$

X	y
1	6
2	10
0	$4\frac{2}{3}$

set exponent = 0
 $x - 1 = 0$
 $x = 1$

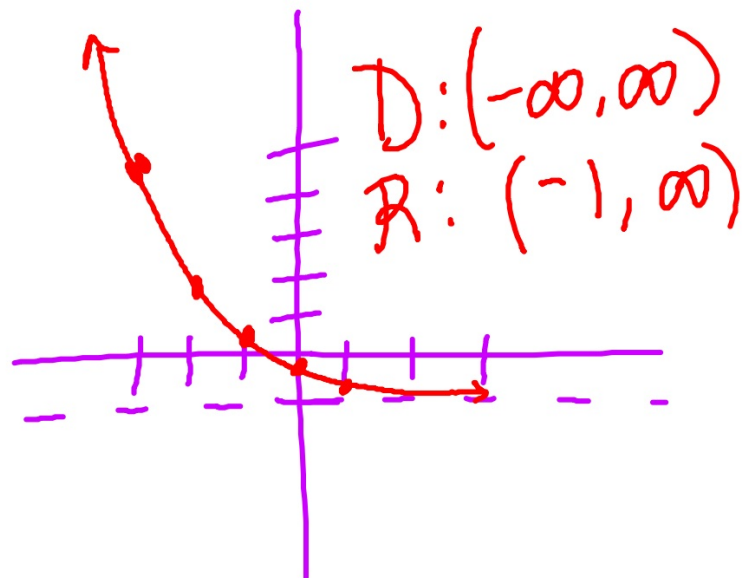


ex: Sketch. Then state the domain and range and classify as growth or decay

Asymp: $y = -1$

b) $y = 3\left(\frac{1}{2}\right)^{x+2} - 1$

x	y
-3	5
-2	2
-1	$\frac{1}{2}$
0	$-\frac{1}{4}$
1	$-\frac{2}{3}$

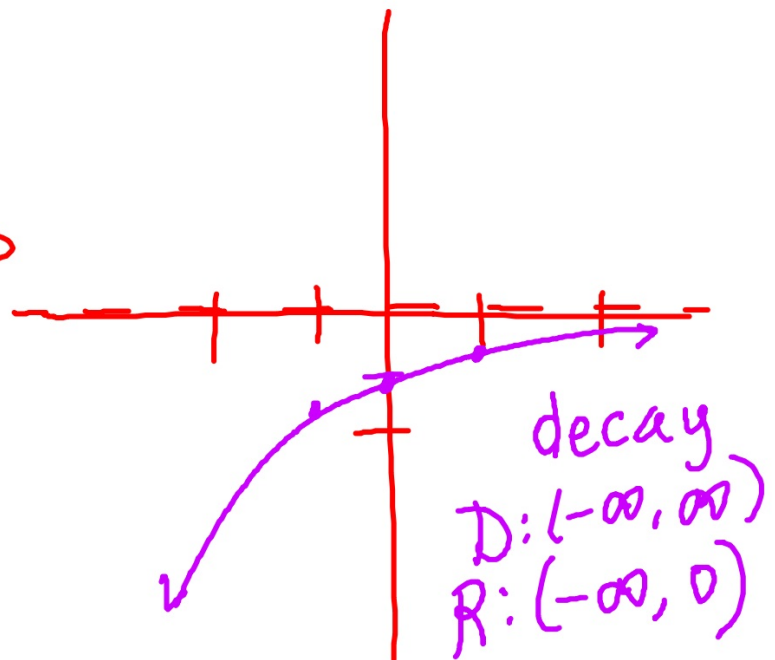


ex: Sketch. Then state the domain and range and classify as growth or decay.

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

Asymptote: $y = 0$

x	y
-1	$-\frac{3}{2}$
0	-1
1	$-\frac{2}{3}$

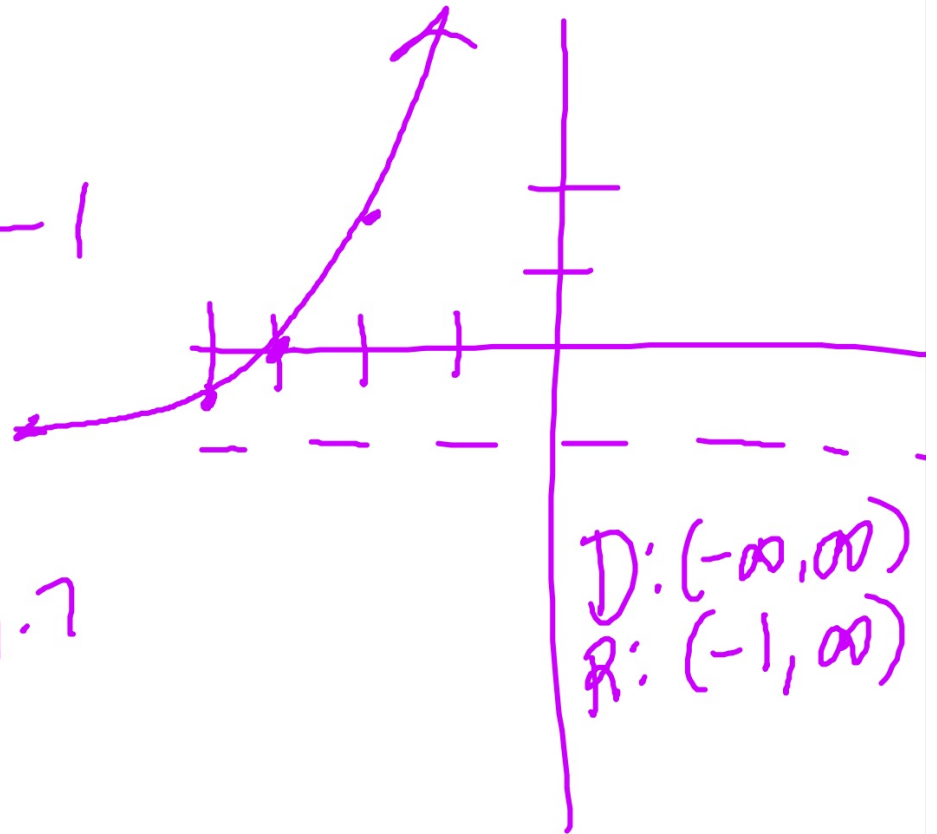


ex: Sketch. Then state the domain and range and classify as growth or decay.

e) $y = e^{x+3} - 1$

asympt: $y = -1$

x	y
-4	-1.63
-3	0
-2	$e^1 - 1 = 1.7$



D: $(-\infty, \infty)$
R: $(-1, \infty)$

Growth or decay???

$$y = 3^{-x}$$

$$y = \left(\frac{1}{3}\right)^x$$

decay

$$y = 3^x$$

growth