The Natural Base, e

Name _____

Date _____ Period _____

The number e is an irrational number that often occurs with exponential and logarithmic functions.

The number e is defined as

$$e = \left(1 + \frac{1}{n}\right)^n \approx 2.718$$

as $n \to \infty$

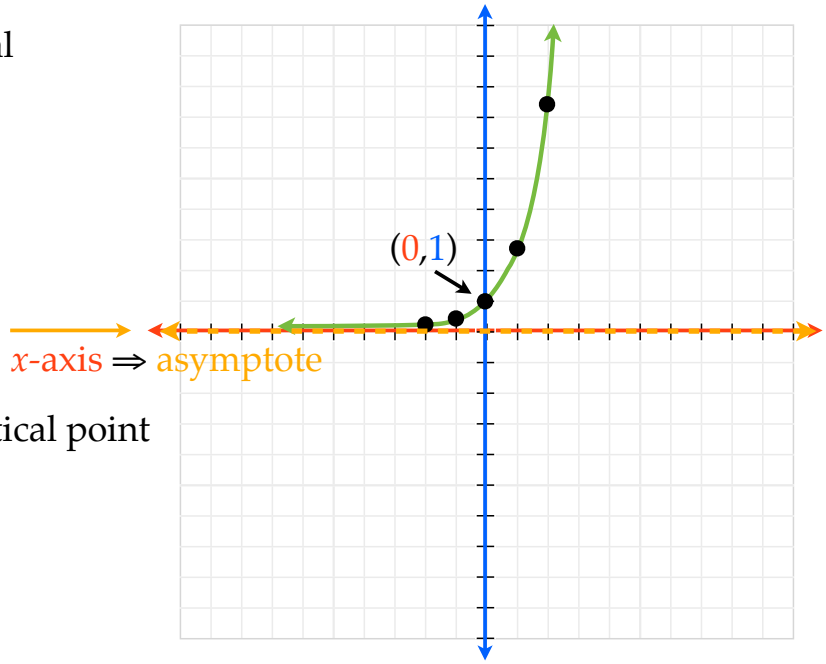
The Natural Base Exponential Parent Function

$$y = e^x$$

$x = 0 \Rightarrow$

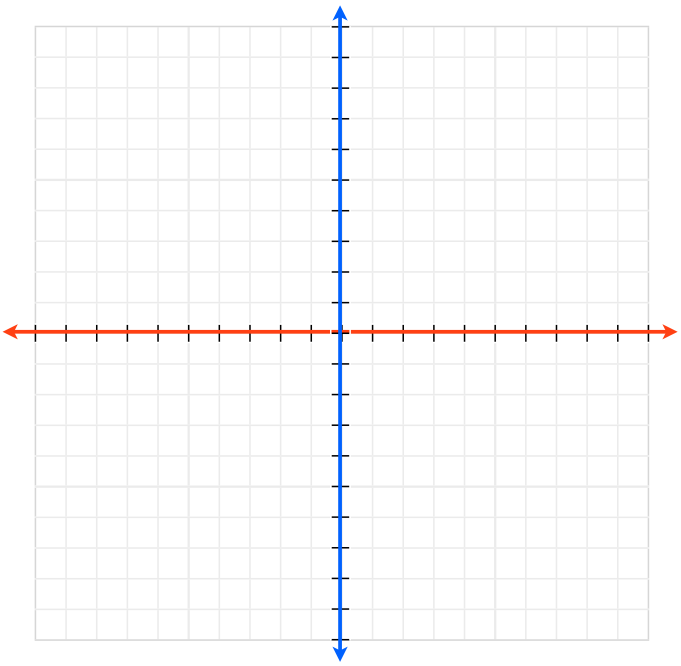
x	y
-2	0.14
-1	0.37
0	1
1	2.72
2	7.39

$\Rightarrow$ critical point



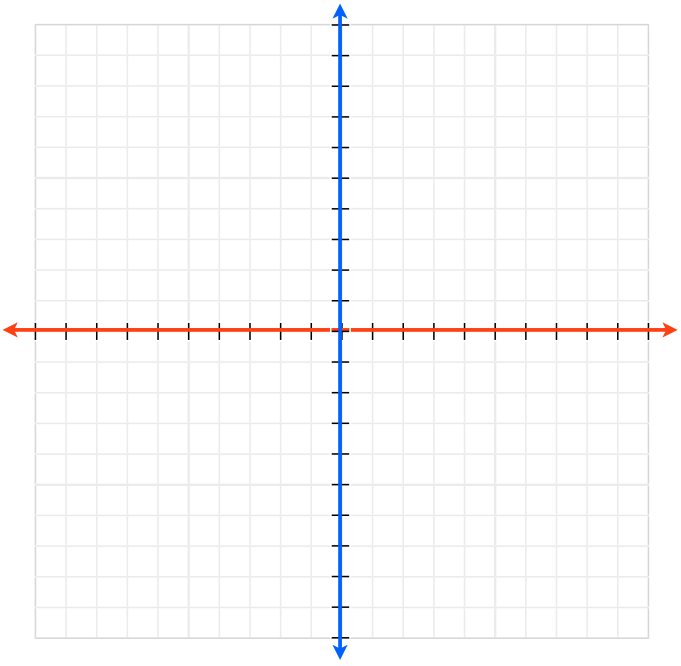
Graph the following exponential equation

$$y = e^{(x-2)} - 5$$



Graph the following exponential equation

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



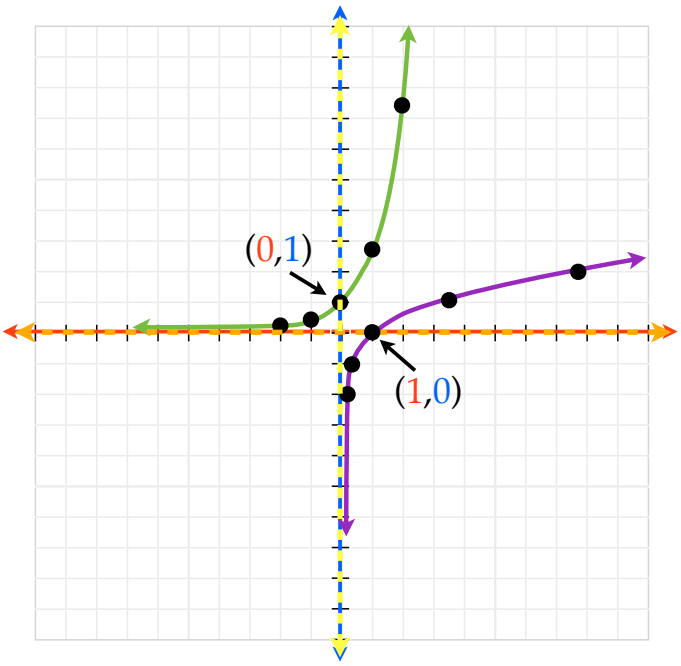
$y = e^x$

x	y
-2	0.14
-1	0.37
0	1
1	2.72
2	7.39

$y = \log_e x$

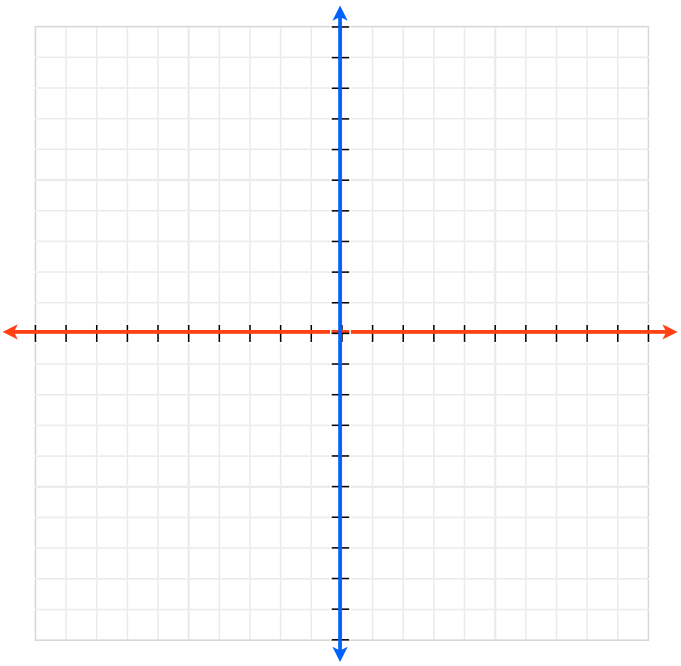
$y = \ln x$

x	y
0.14	-2
0.37	-1
1	0
2.72	1
7.39	2



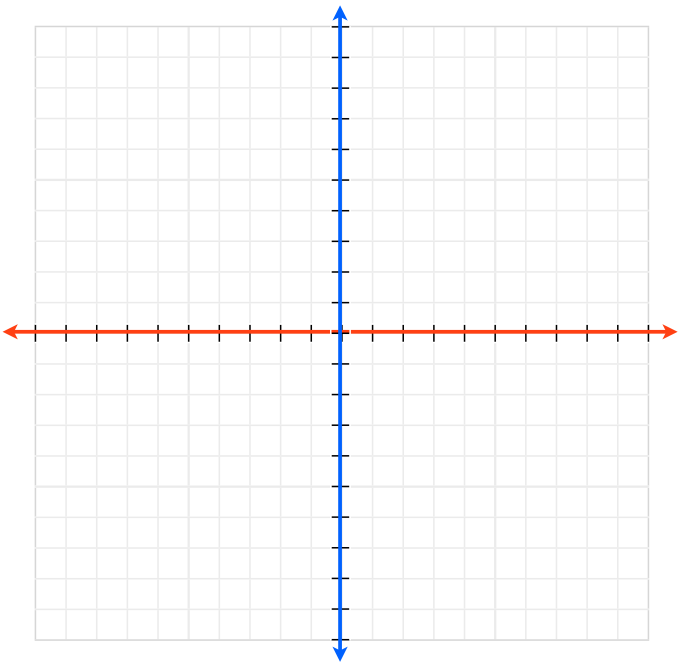
Graph the following logarithmic equation

$$y = \ln (x - 2) - 5$$



Graph the following logarithmic equation

$$y = \ln (x + 5) + 2$$



Properties of the Natural Base, e

$\ln e = 1$ $\quad$ $\ln e^x = x$ $\quad$ $e^{\ln x} = x$

Simplify the following

$\ln e^{(x + 2)}$ $\quad$ $e^{\ln 2x}$ $\quad$ $\ln e^{3a}$ $\quad$ $e^{4 \cdot \ln x}$

Solving equation with the Natural Log

$$\ln x = \log_e x$$

$\ln 3x = 1$ $\ln 5 + \ln x = 4$ $2\ln 3 + \ln x = \ln 27$ $\ln x + \ln x = 2$