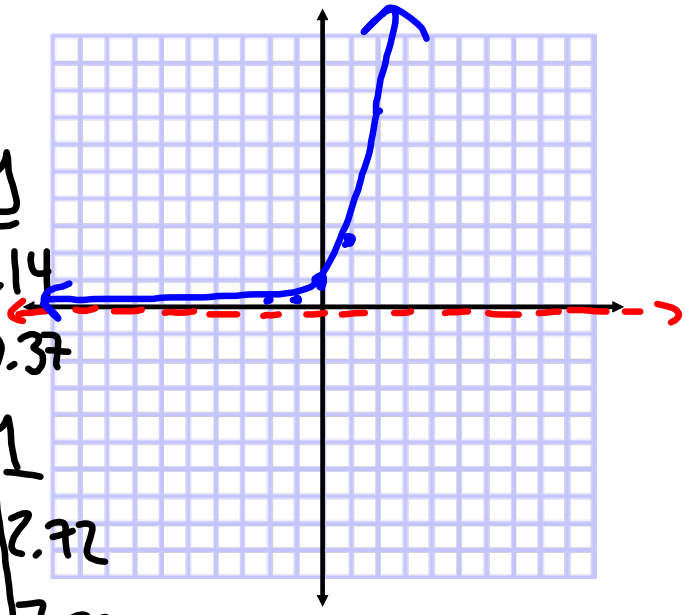
8.3 Part 2 The Number *e*

Sketch the graph of the functions.
State the domain, range, and asymptote.

$f(x) = e^x + 0$

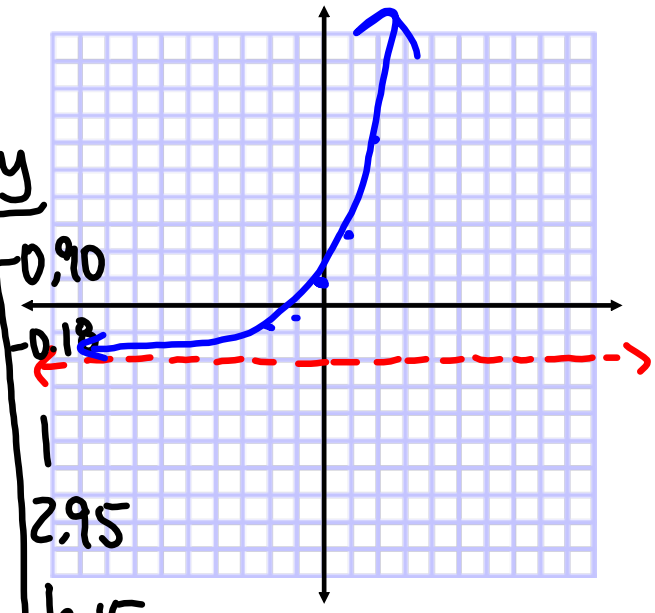
x		y
-2	e^{-2}	0.14
-1	e^{-1}	0.37
0	e^0	1
1	e^1	2.72
2	e^2	7.39



Sketch the graph of the functions.
State the domain, range, and asymptote.

$g(x) = 3e^{.5x} - 2$

x		y
-2	$3e^{.5(-2)} - 2$	-0.90
-1	$3e^{.5(-1)} - 2$	-0.18
0	$3e^{.5(0)} - 2$	1
1	$3e^{.5(1)} - 2$	2.95
2	$3e^{.5(2)} - 2$	6.15



Sketch the graph of the functions.

State the domain, range, and asymptote.

$y = \frac{3}{2}e^{x+2} + 4$

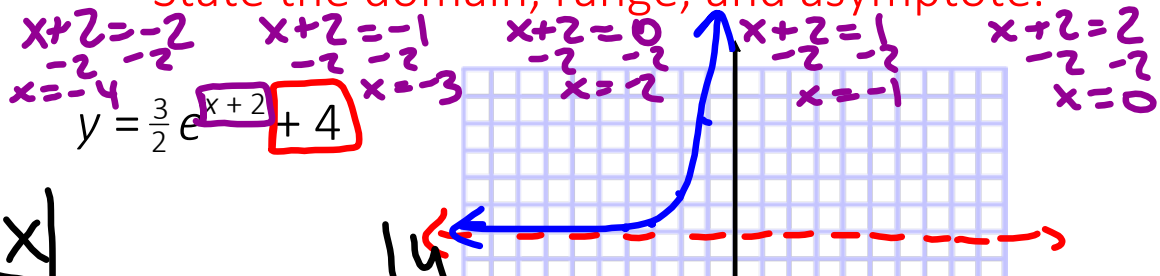
$x+2=-2$, $-2\ -2$, $x=-4$

$x+2=-1$, $-2\ -2$, $x=-3$

$x+2=0$, $-2\ -2$, $x=-2$

$x+2=1$, $-2\ -2$, $x=-1$

$x+2=2$, $-2\ -2$, $x=0$



x	y
-4	$\frac{3}{2}e^{-2}+4$ → 4.20
-3	$\frac{3}{2}e^{-1}+4$ → 4.55
-2	$\frac{3}{2}e^{0}+4$ → 5.5
-1	$\frac{3}{2}e^{1}+4$ → 8.08
0	$\frac{3}{2}e^{2}+4$ → 15.08

Continuous Compound Interest

$$A(t) = Pe^{rt}$$

$A(t)$ = the amount of \$ after t years

P = the amount of \$ invested or borrowed

e = e

r = the percent as a decimal

t = the number of years

Example

$A(t) = Pe^{rt}$ $r = 0.12$

You deposit $1500 in an account that pays 12% annual interest compounded continuously. What is the balance after 1 year? $t = 1$

$A(t) = (1500)e^{0.12 \cdot 1} \approx \$1691.25$

Example

$r = 0.075$

Sallie deposits $2800 in an account that pays 7.5% annual interest compounded continuously. What is the balance after 2 years? $t = 2$

$A(t) = 2800e^{0.075 \cdot 2} \approx \$3253.14$

Example

A radioactive substance decays in such a way that the amount of mass remaining after t days is given by the function $m(t) = 13e^{-0.015t}$ where $m(t)$ is measured in kg.

a) Find the mass at time $t = 0$.

$m(t) = 13e^{-0.015 \cdot 0} = 13$

b) How much of the mass remains after 20 days?

$m(t) = 13e^{-0.015 \cdot 20} \approx 9.631$

c) How much of the mass remains after 45 days?

$m(t) = 13e^{-0.015 \cdot 45} \approx 6.619$