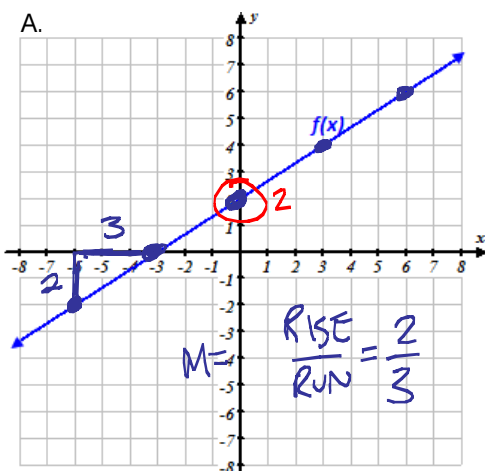
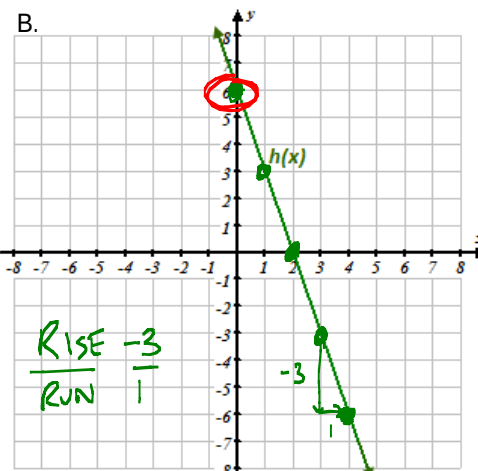


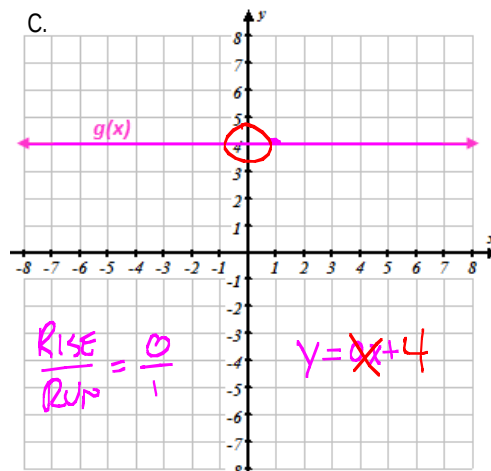
1. Write an equation to describe each **linear function** graphed below.



$$f(x) = \frac{2}{3}x + 2$$



$$h(x) = -\frac{3}{1}x + 0$$



$$g(x) = 4$$

2. Write an equation to describe each **linear function** graphed below.

A. The linear function, $f(x)$, has a slope of $\frac{1}{2}$ and a y-intercept of 4.

$$y = mx + b$$

$$f(x) = mx + b$$

$$f(x) = \frac{1}{2}x + 4$$

$$f(x) = \frac{1}{2}x + 4$$

B. The linear function, $g(x)$, passes through the point $(3, 1)$ and has a slope of $\frac{2}{3}$.

$$g(x) = mx + b$$

$$g(x) = \frac{2}{3}x + b$$

TEST $(3, 1)$ TO FIND "b"

$$1 = \frac{2}{3}(3) + b$$

$$1 = 2 + b$$

$$g(x) = \frac{2}{3}x - 1$$

C. The linear function, $h(x)$, passes through the points $(2, 4)$ and $(6, 2)$.

$$M = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 4}{6 - 2} = \frac{-2}{4} = -\frac{1}{2}$$

$$h(x) = -\frac{1}{2}x + b$$

TEST $(2, 4)$ TO FIND "b"

$$(4) = -\frac{1}{2}(2) + b$$

$$4 = -1 + b$$

$$+1 \quad +1$$

$$5 = b$$

$$h(x) = -\frac{1}{2}x + 5$$

D. The linear function, $p(x)$, is parallel to the function $t(x) = \frac{1}{4}x + 2$ and passes through the point $(8, 1)$.

$$M = \frac{1}{4}$$

$$||M = \frac{1}{4}$$

$$p(x) = \frac{1}{4}x + b$$

TEST $(8, 1)$ TO FIND "b"

$$(1) = \frac{1}{4}(8) + b$$

$$1 = 2 + b$$

$$-2 \quad -2$$

$$-1 = b$$

$$p(x) = \frac{1}{4}x - 1$$

3. Write an equation to describe each **linear function** graphed below.

A. Determine an equation that describes $d(x)$ based on the partial set of values in the table below.

x	-2	0	2	4	6
d(x)	1	2	3	4	5

RATE OF CHANGE IS CONSTANT SO ITS LINEAR

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 2}{2 - 0} = \frac{1}{2}$$

$$y = mx + b$$

$$y = \frac{1}{2}x + b$$

TEST (0, 2)

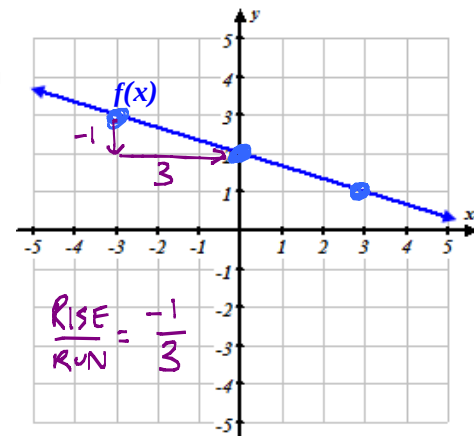
$$(2) = \frac{1}{2}(0) + b$$

$$2 = 0 + b$$

$$2 = b$$

$$d(x) = \frac{1}{2}x + 2$$

B. Determine an equation that describes $m(x)$, given that $m(x)$ is parallel to $f(x)$ (shown in the graph at the right) and it passes through the point (3, -2).



$$\frac{\text{RISE}}{\text{RUN}} = -\frac{1}{3}$$

$$-2 = -1 + b$$

$$-1 = b$$

$$m(x) = -\frac{1}{3}x - 1$$

4. Consider the **exponential function**, $f(x) = 2^x$.

A. Fill in the missing values in the table below.

	x	f(x)
→	3	8
→	0	1
→	2	4
→	1	2
→	-1	0.5
→	-3	0.125

$$f(3) = 2^3 = 2 \cdot 2 \cdot 2 = 8$$

$$f(0) = 2^0 = 1$$

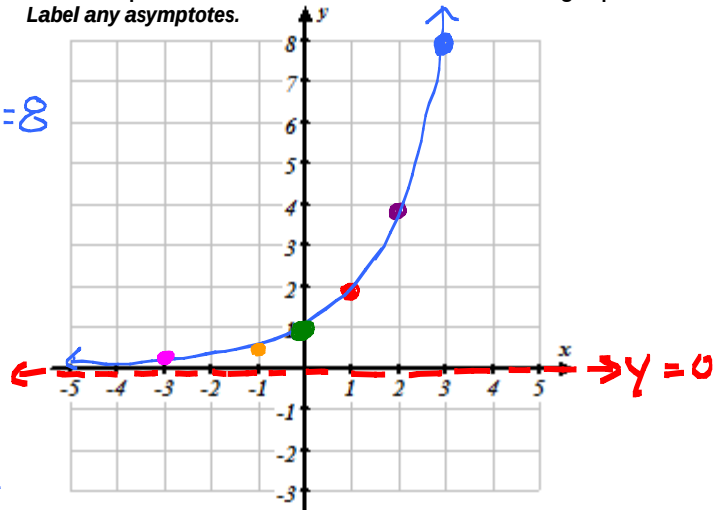
$$f(2) = 2^2 = 4$$

$$f(1) = 2^1 = 2$$

$$f(-1) = 2^{-1} = \frac{1}{2^1} = \frac{1}{2}$$

$$f(-3) = 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

B. Plot the points from the table and sketch a graph. Label any asymptotes.



5. Consider the **exponential function**, $g(x) = 3^x - 2$.

A. Fill in the missing values in the table below.

	x	g(x)
→	2	7
→	3	25
→	1	1
→	0	-1
→	-1	-1.6
→	-3	-1.96

ASYMPTOTE
 $y = -2$

$$f(2) = 3^2 - 2 = 9 - 2 = 7$$

$$f(3) = 3^3 - 2 = 27 - 2 = 25$$

$$f(1) = 3^1 - 2 = 1$$

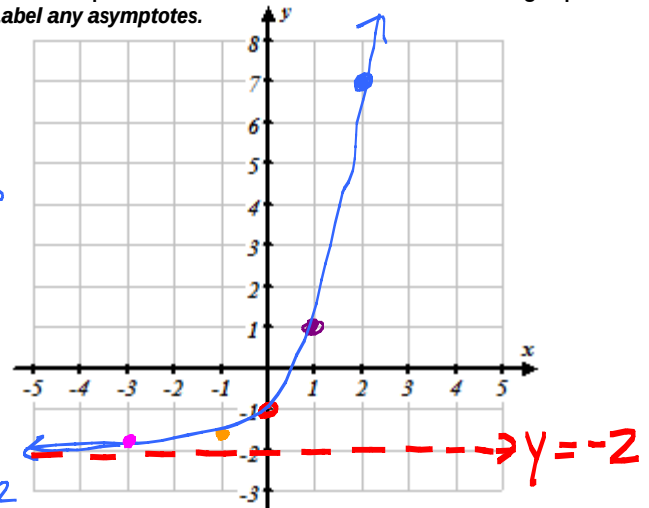
$$f(0) = 3^0 - 2 = 1 - 2 = -1$$

$$f(-1) = 3^{-1} - 2 = \frac{1}{3} - 2 = -\frac{5}{3}$$

$$f(-3) = 3^{-3} - 2 = \frac{1}{27} - 2 = \frac{1}{27} - \frac{54}{27} = -\frac{53}{27}$$

$$3^{-3} - 2 = \frac{1}{27} - 2 = -1.962962963$$

B. Plot the points from the table and sketch a graph. Label any asymptotes.



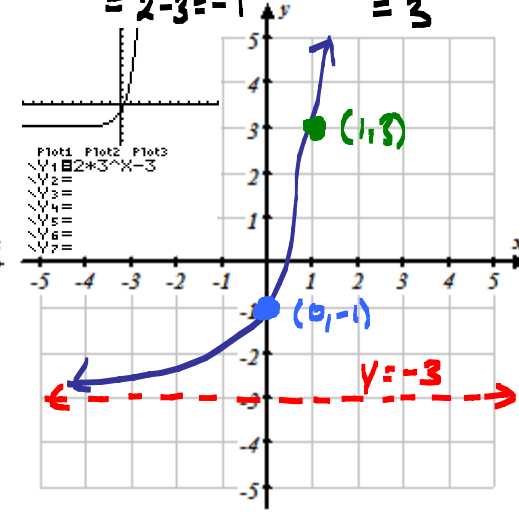
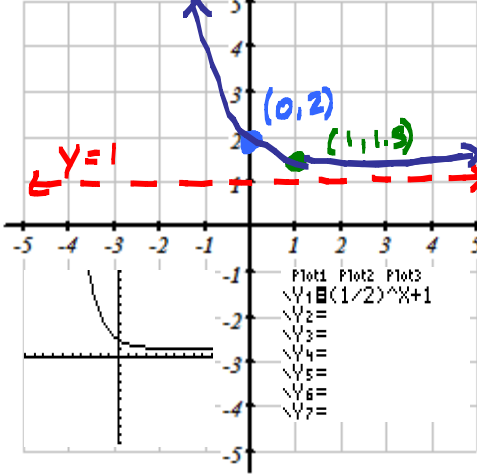
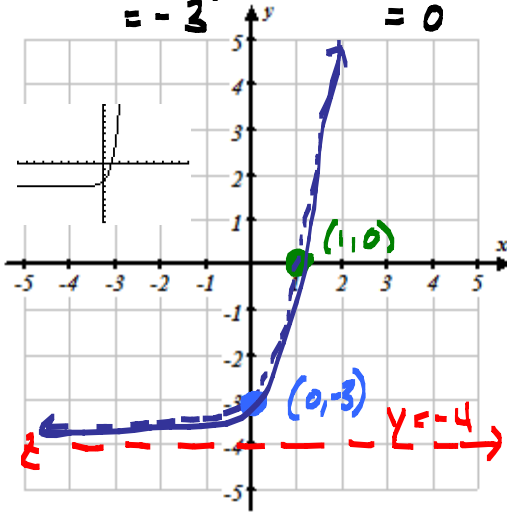
$$\frac{1}{27} - \frac{2 \cdot 27}{1 \cdot 27} = \frac{1}{27} - \frac{54}{27} = -\frac{53}{27}$$

6. For each of the functions, determine the asymptote and sketch a graph (label the points when $x = 0$ and when $x = 1$.)

A. $f(x) = 4^x - 4$ ← ASYM. $y = -4$
 $f(0) = 4^0 - 4 = 1 - 4 = -3$
 $f(1) = 4^1 - 4 = 4 - 4 = 0$

B. $g(x) = (\frac{1}{2})^x + 1$ ← ASYMPTOTE $y = 1$
 $g(0) = (\frac{1}{2})^0 + 1 = 1 + 1 = 2$
 $g(1) = (\frac{1}{2})^1 + 1 = \frac{1}{2} + 1 = 1.5$

C. $h(x) = 2 \cdot 3^x - 3$ ← ASYM. $y = -3$
 $h(0) = 2 \cdot 3^0 - 3 = 2 \cdot 1 - 3 = 2 - 3 = -1$
 $h(1) = 2 \cdot 3^1 - 3 = 6 - 3 = 3$



7. Create two different exponential functions of the form $f(x) = a \cdot b^x + c$ that have a horizontal asymptote at $y = 2$.

$f(x) = 4 \cdot 3^x + 2$ $g(x) = 1 \cdot (\frac{1}{2})^x + 2$

8. Given the function $f(x)$ is of the form $f(x) = a \cdot b^x + c$, has a horizontal asymptote at $y = 2$, and passes through the point $(0, 5)$, create a possible function for $f(x)$.

$f(x) = a \cdot b^x + 2$

$f(x) = a \cdot 2^x + 2$

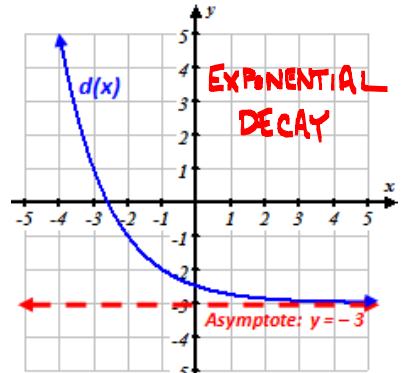
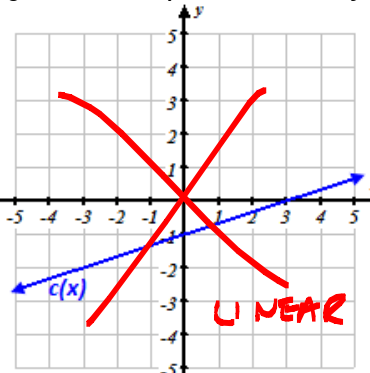
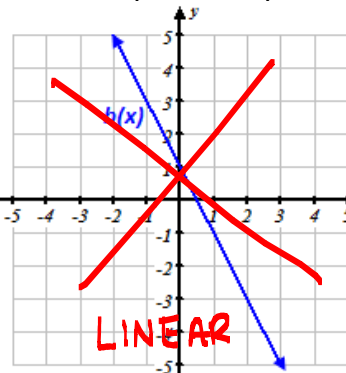
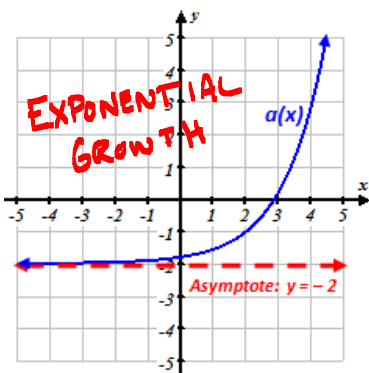
TEST (0, 5)

$5 = a \cdot 2^0 + 2$

$5 = a + 2$
 $-2 \quad -2$
 $3 = a$

$f(x) = 3 \cdot 2^x + 2$

9. Tell which functions below could represent exponential growth or exponential decay.



~~LINEAR~~

	0	1	2	3	5
$f(x)$	3	5	7	9	13

CONSTANT RATE

x	1	2	3	4	5
$g(x)$	65	33	17	9	5

EXponential DECAY

x	1	2	3	4	5
$h(x)$	3	7	19	55	163

EXponential GROWTH

~~$j(x) = 4x + 2$~~

~~LINEAR~~

$k(x) = 192 \cdot (0.5)^x + 8$

EXponential DECAY

↑
PARAMETER IS BETWEEN 0 AND 1

$m(x) = 3 \cdot (1.5)^x + 2$

EXponential GROWTH

↑
PARAMETER IS GREATER THAN 1

~~$n(x) = \frac{1}{2}x + 6$~~

~~LINEAR~~

10. In a science experiment, a student is measuring the height of a plant each week. The student began the project on week 0 with the plant already 4 inches tall. The student determined that the plant would increase in height by 20% each week (for the first 10 weeks). Create an exponential function of the form $f(t) = a \cdot b^t$ that describes the height of the plant as a function of t , where t is the number of weeks after the project began.

$f(x) = 4 \cdot (1.20)^x$

11

PLANT THAT STARTED AT 5 INCHES & GREW BY
40% EACH WEEK

$$f(x) = 5 \cdot (1.40)^x$$