

Advanced Algebra w/ Trig

Name: _____

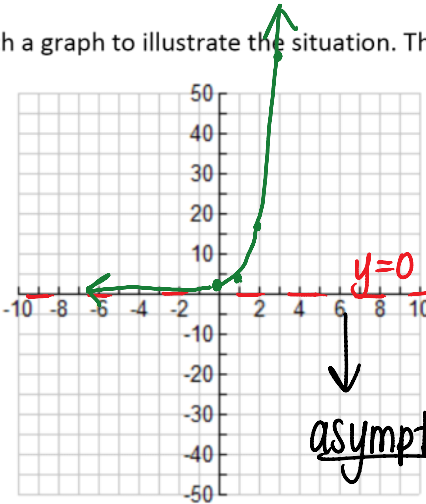
7.1 Exponential Growth Functions

1. Nick posted an embarrassing picture of himself on Facebook (he was doing math homework on the beach over summer vacation...). The photo is quickly spreading like wildfire and the amount of people viewing it quadruples every hour.

Complete the table and then sketch a graph to illustrate the situation. Then write an equation to represent the function.

time x (hours)	$f(x)$ # of people
0	1
→ 1	4
→ 2	16
→ 3	64
4	256

) $\times 4$
) $\times 4$
) $\times 4$
) $\times 4$



$f(x) = 4^x$

domain: $(-\infty, \infty)$

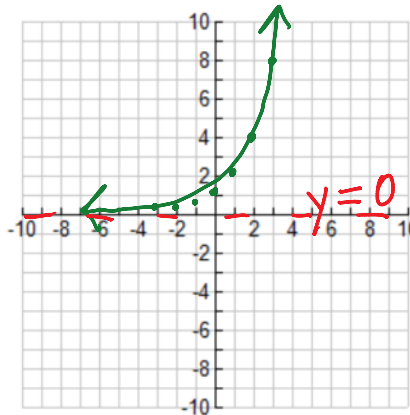
range: $(0, \infty)$

asymptote: imaginary line that the graph approaches but never touches

2. Graph $f(x) = 2^x$ on the axes at right.

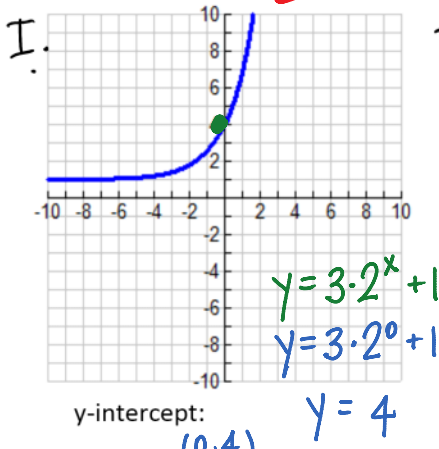
x	-3	-2	-1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow
 2^{-2} 2^{-1} 2^0 2^1 2^2 2^3

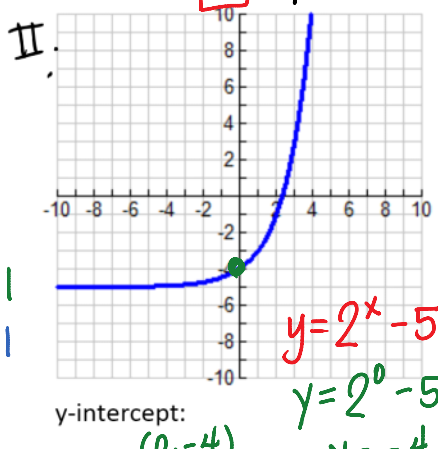


Match the following equations with the corresponding graph. Identify the y-intercept and the equation of the horizontal asymptote (H.A.) of each graph.

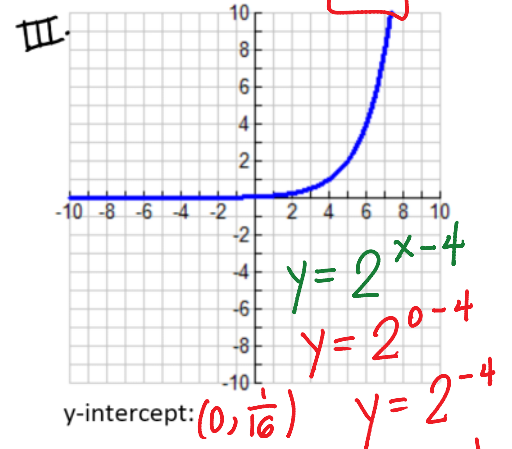
3. $y = 2^x - 5$ $\downarrow 5$ II

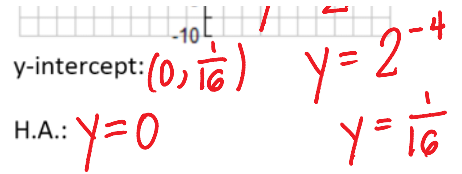
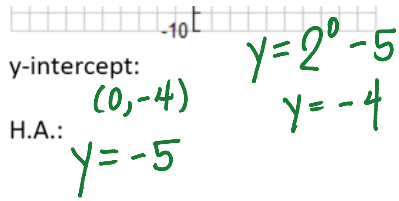
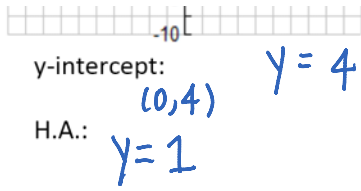


4. $y = 3 \cdot 2^x + 1$ I $\uparrow 1$



5. $y = 2^{x-4}$ $\rightarrow 4$ III





THE RULE FOR EXPONENTIAL GRAPHS AND THEIR EQUATIONS:

$$y = a \cdot b^x$$

↑ initial value (or y-intercept)
↑ base (or multiplier)

GROWTH
 $b > 1$

6. Write an equation of the exponential function based on each the following tables.

x	0	1	2	3	4
y	4	20	100	500	2500

+1 +1 +1 +1
x5 x5 x5

$$y = a \cdot b^x$$

$$y = 4 \cdot 5^x$$

$a = 4$
 $b = 5$

x	-2	-1	0	1	2
y	4	6	9	13.5	20.25

$\frac{6}{4} = \frac{3}{2}$
 $\frac{9}{6} = \frac{3}{2}$
 $* \frac{3}{2}$
 $y = 9 \cdot (\frac{3}{2})^x$

7. You deposit \$500 in an account that pays 8% annual interest compounded yearly.

a. Write an equation representing the total amount of money in your account in years.

$$y = 500(1 + 0.08)^x \Rightarrow y = 500(1.08)^x$$

~ 0.08

b. What is the account balance after 6 years?

$$y = 500(1.08)^6 = \boxed{\$793.44}$$

108%

c. How much would the \$500 be worth after 35 years?

↑ decimals

$$y = a(1+r)^x$$

$$y = 500(1.08)^{35} = \boxed{\$7392.67}$$

8. In 1985 there were 285 cell phone subscribers in the small town of Centerville. The number of subscribers increased by 75% per year after 1985.

a. Write a function that models how many cell phone subscribers there were over time.

$$y = 285(1.75)^x$$

b. How many cell phone subscribers were in Centerville in 1994?

$$y = 285(1.75)^9$$

1994

d. How many cell phone subscribers were in Centerville in 1994?

$$y = 285(1.75)^x$$

$$\boxed{43,871 \text{ people}}$$

$$\begin{array}{r} 1994 \\ -1985 \\ \hline 9 = x \end{array}$$