HW 9-6

1. {-1}
2. {   }
3. {101/4}
4. {11}
5. {-3}
6. {10}
7. {-15}

Name____ Alg 2 HW 9-6

Solve and check.

1. $\sqrt{x+10} = 2 - x$

$(\sqrt{x+10})^2 = (2-x)^2$

$x+10 = (2-x)(2-x)$

$x+10 = 4 - 4x + x^2$

$\underline{-x\ -10} \quad \underline{-10\ -x}$

$x^2 - 5x - 6 = 0$

$(x-6)(x+1) = 0$

$x-6=0 \qquad x+1=0$

$x=6 \qquad x=-1$

Check

$\sqrt{6+10} = 2-6$

$\sqrt{16} = -4$

$4 \neq -4$

Check

$\sqrt{-1+10} = 2--1$

$\sqrt{9} = 3$

$3 \overset{\checkmark}{=} 3$

$\{-1\}$

2. $5 - \sqrt{6x} = 16$

$-5 \qquad -5$

$(-\sqrt{6x})^2 = (11)^2$

$\frac{6x}{6} = \frac{121}{6}$

$x = \frac{121}{6}$

$\{\ \}$

Check

$5 - \sqrt{6\left(\frac{121}{6}\right)} = 16$

$5 - \sqrt{121} = 16$

$5 - 11 = 16$

$-6 \neq 16$

3. $12 = 52 - 4\sqrt{4x-1}$

$-52 \quad -52$

$\frac{-40}{-4} = \frac{-4\sqrt{4x-1}}{-4}$

$(10)^2 = (\sqrt{4x-1})^2$

$4x - 1 = 100$

$4x = 101$

$x = \frac{101}{4}$

$\left\{\frac{101}{4}\right\}$

Check

$12 = 52 - 4\sqrt{4\left(\frac{101}{4}\right)-1}$

$12 = 52 - 4\sqrt{101-1}$

$= 52 - 4\sqrt{100}$

$= 52 - 40$

$12 \overset{\checkmark}{=} 12$

4. $\sqrt{2x-5} - \sqrt{x+6} = 0$

$+\sqrt{x+6} \quad +\sqrt{x+6}$

$(\sqrt{2x-5})^2 = (\sqrt{x+6})^2$

$2x - 5 = x + 6$

$-x + 5 \quad -x + 5$

$x = 11$

Check

$\sqrt{2(11)-5} - \sqrt{11+6} = 0$

$\sqrt{17} - \sqrt{17} = 0$

$0 = 0$

$\{11\}$

5. $\sqrt{2x+15} = x+6$

$\left(\sqrt{2x+15}\right)^2 = (x+6)^2$

$2x+15 = (x+6)(x+6)$

$2x+15 = x^2+12x+36$

$-2x-15 \qquad -2x \quad -15$

$0 = x^2+10x+21$

$(x+7)(x+3)=0$

$x+7=0$	$x+3=0$
$x=-7$	$x=-3$
Check	Check
$\sqrt{2(-7)+15}=-7+6$	$\sqrt{2(-3)+15}=-3+6$
$\sqrt{1}=-1$	$\sqrt{9}=3$
$1\neq-1$	$3\overset{\checkmark}{=}3$

$\{-3\}$

6. $\sqrt{x-1}+4 = x-3$

$-4 \qquad -4$

$\left(\sqrt{x-1}\right)^2 = (x-7)^2$

$x-1 = x^2-14x+49$

$-x+1 \qquad -x \quad +1$

$x^2-15x+50=0$

$(x-10)(x-5)=0$

$x-10=0$	$x-5=0$
$x=10$	$x=5$
Check	Check
$\sqrt{10-1}+4=10-3$	$\sqrt{5-1}+4=5-3$
$\sqrt{9}+4=7$	$\sqrt{4}+4=2$
$3+4=7$	$2+4=2$
$7\overset{\checkmark}{=}7$	$6\neq2$

$\{10\}$

7. Solve algebraically for all values of x:

$\sqrt{6-2x}+x=2(x+15)-9$

$\sqrt{6-2x}+x=2x+30-9$

$\underline{-x} \quad \underline{-x}$

$\left(\sqrt{6-2x}\right)^2=(x+21)^2$

$6-2x=(x+21)(x+21)$

$6-2x=x^2+42x+441$

$\underline{-6} \; \underline{+2x} \qquad \underline{+2x} \quad \underline{-6}$

$x^2+44x+435=0$

$(x+15)(x+29)=0$

$x+15=0 \qquad x+29=0$

$x=-15 \qquad x=-29$

Check:

$x=-15$

$\sqrt{6+30}-15=2(0)-9$

$6-15=-9$

$-9=-9$

$x=-29$

$\sqrt{6+58}-29=2(-29+15)-9$

$\sqrt{64}-29=2(-14)-9$

$8-29=-37$

$-21\neq-37$

$\{-15\}$

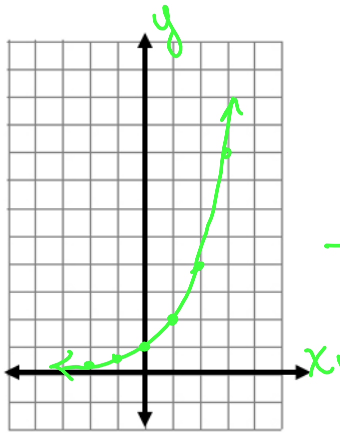
Exponential Growth and Decay

Exponential Growth & Decay Unit 9 Day 7

Exponential Function: $f(x) = b^x$

Graph $f(x) = 2^x$

x	y
-2	1/4
-1	1/2
0	1
1	2
2	4



Exponential growth or decay? (Circle One)

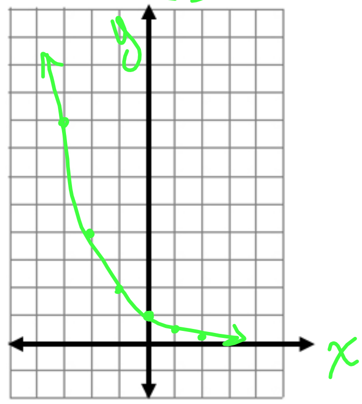
End Behavior:

$x \to -\infty$ $f(x) \to$ 0

$x \to \infty$ $f(x) \to$ ∞

Graph $f(x) = 2^{-x} = \frac{1}{2^x} = \left(\frac{1}{2}\right)^x$

x	y
-2	4
-1	2
0	1
1	1/2
2	1/4



Exponential growth or decay? (Circle One)

End Behavior:

$x \to -\infty$ $f(x) \to$ ∞

$x \to \infty$ $f(x) \to$ 0

How can you tell from a given exponential function whether or not it will grow or decay?

base > 1 → growth   base < 1 → decay

(with a (+) exponent of x)

<u>Summary</u>:

Point on every exponential graph: (0,1)

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

Range: $(0, \infty)$

Quadrants: I, II

Asymptote(s)? x-axis (y=0)

Are exponential functions 1-1? How can you tell? What does this tell you about their inverses?

- yes passes both vert + horiz. line tests

- Inverse will ~~do~~ also be a function

1. Now let's look at the function $f(x) = 7(3)^x$

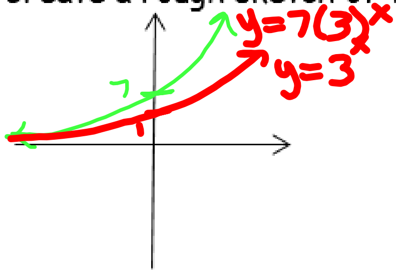
   Determine the y-intercept of this function algebraically.

   $f(0) = 7(3)^0 = 7(1) = 7$

   Does the exponential function increase or decrease? Why?

   Inc b/c Base > 1

   Create a rough sketch of this function, labeling its y-intercept.



   How does this function's graph compare to that of $f(x) = 3^x$?

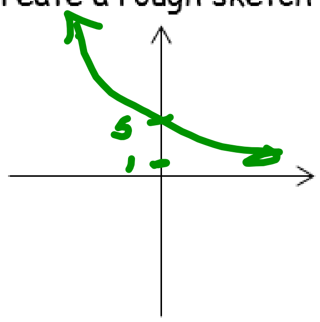
   - Different y-int (7 v 3)
   - Vert. stretch x7

2. Now you look at the function $f(x) = (\frac{1}{3})^x + 4$.

Does the exponential function increase or decrease? Why?

base < 1

Create a rough sketch of this function, labeling its y-intercept.



Determine the graph's y-intercept algebraically.

$f(0) = (\frac{1}{3})^0 + 4$

$1 + 4 = 5$

How does this function's graph compare to that $f(x) = (\frac{1}{3})^x$?

up 4

Can you recall the rules for transformations that we discussed earlier in the course? Let's look at two more exponential functions and see what transformations occurred.

1. $g(x) = 2^{x-2} - 1$

down 1 and right 2

2. $h(x) = \frac{1}{3}(4)^{x+3}$

Vert. compression & X 1/3 and trans. 3 to left

One of the skills you acquired in Algebra 1 CC was the ability to write equations of exponential functions if you had information about the starting value and the base(growth constant). Determine the function of the form $f(x) = a \bullet b^x$ with the information in the table below. Before we start, what do a and b represent in this function.

a = starting value (x=0) or Vert. stretch

b = base (growth constant)

You can use your calculator to generate the equation for the data. You will need to enter your data into a list by using $STAT \rightarrow EDIT$ and then use the $STAT \rightarrow CALC \rightarrow$ 0 ExpReg to generate the actual equation.

Enter Data

2nd (+) 4 clr lists

a= 5

b= 3

f(x)= $5(3)^x$

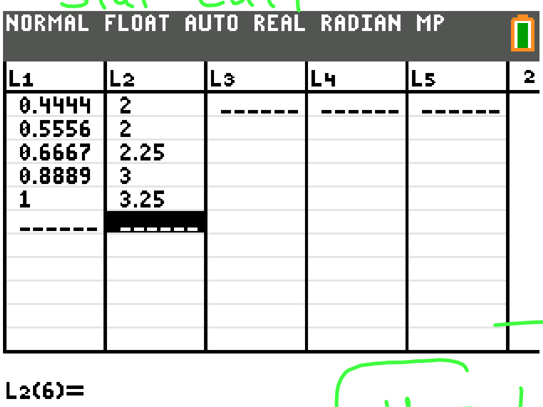
L1	x	0	1	2	3
L2	f(x)	5	15	45	135

A runner is using a nine-week training program app to prepare for a "fun run." The table below represents the amount of the program completed, A, and the distance covered in a session, D, in miles.

L_1 A	4/9	5/9	6/9	8/9	1
L_2 D	2	2	2.25	3	3.25

Based on the data, write an exponential regression equation, rounded to the *nearest thousandth*, to model the distance the runner is able to complete in a session as she continues through the nine-week program.

Stat - Edit



stat-Calc-0

$$y = 1.223(2.652)^x$$