HW 9-5

Quiz tomorrow on Day 5
Solving a radical equation.

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

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Name_____ Alg 2 HW 9 5

Solve and check.

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

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

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

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

$-x \quad -10 \quad -10 \quad -x$

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

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

$x-6=0$ | $x+1=0$

$x=6$ | $x=-1$

Check | Check

$\sqrt{6+10} = 2-6$ | $\sqrt{-1+10} = 2--1$

$\sqrt{16} = -4$ | $\sqrt{9} = 3$

$4 \neq -4$ | $3 = 3$ ✓

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

$-5 \quad -5$

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

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

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

{ }

Check

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

$5 - \sqrt{121} = 16$

$5 - 11 = 16$

$-6 \neq 16$

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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

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

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

$= 52 - 4\sqrt{100}$

$= 52 - 40$

$12 \stackrel{\checkmark}{=} 12$

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

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

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

$0 = 0$

$\{11\}$

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

$\sqrt{x^2} = \sqrt{4}$

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

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

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

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

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

$\{-3\}$

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

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

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

$-4 \quad -4$

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

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

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

$\{10\}$

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

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

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

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7. Solve algebraically for all values of x:

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

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

$-x \quad -x$

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

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

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

$-6+2x \quad +2x \quad -6$

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

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

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

$x=-15 \quad x=-29$

Check:

$x=-15$

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

$6-15=-9$

$-9=-9$

$\{-15\}$

$x=-29$

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

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

$8-29=-37$

$-21\neq-37$

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Exponential Growth and Decay

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Exponential Growth & Decay

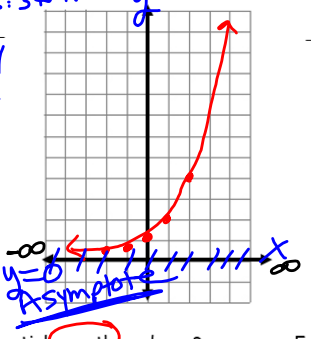
Unit 9 Day 6

Exponential Function: $f(x) = b^x$ → power, → base

Graph $f(x) = 2^x$

take 6 pts: 3 to the left of 0 and 3 to the right of 0 (-3, -2, -1, 0, 1, 2, 3)

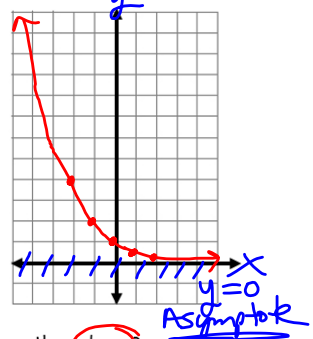
x	y
-2	1/4
-1	1/2
0	1
1	2
2	4



Exponential growth or decay?
(Circle One)
End Behavior:
$x \to -\infty$ $f(x) \to 0$
$x \to \infty$ $f(x) \to \infty$

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

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



Exponential growth or decay?
(Circle One)
End Behavior:
$x \to -\infty$ $f(x) \to \infty$
$x \to \infty$ $f(x) \to 0$

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

growth → base > 1

decay → 0 < base < 1

2^x $\left(\frac{1}{2}\right)^x$ $\frac{1}{2}$

$y = 0^x$ base ≠ 0

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Summary:

Point on every exponential graph: (0,1)

$y = b^x$ $y = b^0$ $y = 1$

Domain: $(-\infty, \infty)$ or $\{x \mid x \in \mathbb{R}\}$

Range: $(0, \infty)$ or $\{y \mid y > 0\}$

Quadrants: I and II

Asymptote(s)? $y = 0$

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

yes 1-1 b/c they both pass the vertical + horizontal line tests. Their inverses will be functions.

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

Does the exponential function increase or decrease? Why?

increases b/c base = 3 which is > 1.

Determine the y-intercept of this function algebraically.

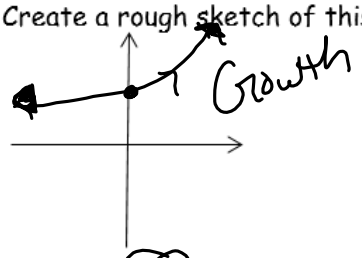
set $x = 0$

$f(0) = 7(3)^0 = 7(1) = 7$ = y-intercept

(0, 7)

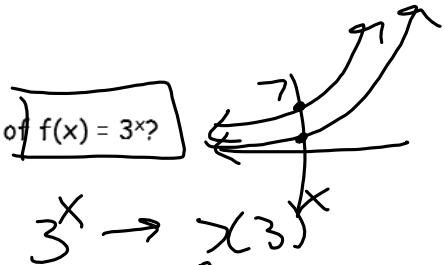
(0, 7)

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



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

$7(3)^x$ closer to y-axis.



vertical stretch w/ factor = 7

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

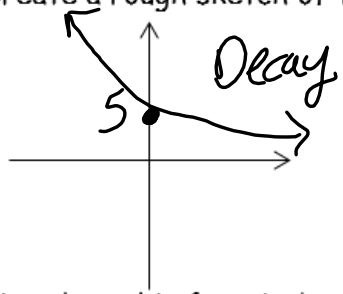
Does the exponential function increase or decrease? Why?

b/c the base = $\frac{1}{3}$ and between 0 and 1

Determine the graph's y-intercept algebraically. set $x = 0$

$f(0) = (\frac{1}{3})^0 + 4 = 1 + 4 = 5$ = y-intercept.

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



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

$(\frac{1}{3})^x + 4$

vertical shift up 4

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

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

x−2: right 2

−1: down 1

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

$\frac{1}{3}$ = vertical compression w/ factor = 1/3

4^x

x+3 = left 3

3. $f(x) = -4(2^{x+3}) + 3$

↳ rx-axis

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= initial value

b= growth or decay rate

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 → EDIT and then use the STAT → CALC → ExpReg to generate the actual equation.

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

a= 5

b= 3

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

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

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