Unit 1 Review: Polynomials

Name:_____

Directions: Multiply the polynomials

1) $(y-5)(y^2-2y+4)$

Directions: Given one factor, factor completely.

2) $(p+2)$ is a factor of $(3p^3-4p^2-13p+14)$

Directions: Factor Completely.

3) $4n^4-16n^2+15$

4) $3x^3+4x^2-3x-4$

5) $(x^4-11x^2+30)(5x^3-x^2-15x+3)$

CIRCLE the best answer.

6) Multiply: $(7x-2y)(8x+7y)$

A. $24x^2+53xy-7y^2$
B. $16x^2-14xy-24y^2$
C. $56x^2+33xy-14y^2$
D. $16x^2+8xy-24y^2$

7) Let $p(x)=x^3+x^2-6$. What is the remainder when *p(x)* is divided by $(x+1)$? Show work.

A. -6
B. 0
C. 1
D. 6

Directions: Perform the indicated operation.	Directions: Find the zeroes.
8) $\frac{m^3+4m^2+m-10}{m+3}$	9) $2h^2 - 13h + 5 = -2h$

20) The following rectangle has an area of $3x^2 - 5x - 12$.

a) What are the possible side lengths, in terms of *x*, for the rectangle? **(+3 points)**

b) Explain your answer and justify how you know that the sides you found are indeed possible lengths. (use complete sentences, diagrams, shown work). **(+3 points)**

Unit 2 Polynomial Graphs Corrective Assignment

Period_____

Name_____

Use the Remainder Theorem to find the remainder for each of the following divisions:

1. $\frac{x^3-x^2-x-1}{x-2}$

2. $\frac{-x^3-x^2+3}{x+3}$

3. Is $(x-4)$ a factor of $2x^4-9x^3-20x^2+147x-180$? Find out by using the Factor theorem.

4. Write a polynomial function in standard form that has the following zeros at x = 2, x = -½ and x = -1.

5. Find the value of p such that $\frac{px^2-4px-8}{x-5}$ has a remainder of -3.

Sketch the following functions without a graphing utility.

6. $F(x)=-2(x-1)(2x+1)(x+5)$

Degree:

End Behavior:

Zeros/Multiplicity:

Sketch:

7. $D(x)=2(x+3)(x-3)(x-6)^2$

Degree:

End Behavior:

Zeros/Multiplicity:

Sketch:

Use your calculator to find the zeros, find the extrema and tell the end behavior. If necessary, round to the nearest hundredth.

8. $F(x) = 3x^3 - 4.1x^2 - x + 1$

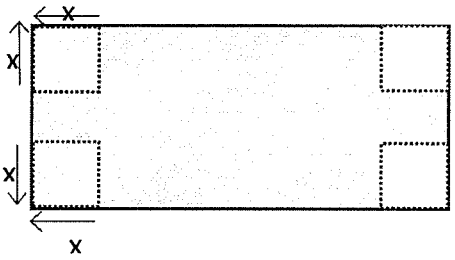
Zeros:

End Behavior:

Extrema:

9. Suppose we have a piece of cardboard that is 35 cm by 20 cm. We want to construct an open topped box by cutting out congruent squares from each corner.

a. Express the dimensions of the box in terms of x:

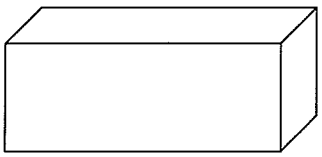


b. Write a formula for the volume of the box as a function of x in standard form.

c. Find the value of x that would maximize the volume of the box.

d. What is the largest volume possible?

10. Suppose you know that the volume of the following prism is represented by $V(x) = -2x^3 + 14x^2 + 120x$.



(x – 12)

a. If one known side is (x - 12) feet, find the other two dimensions.

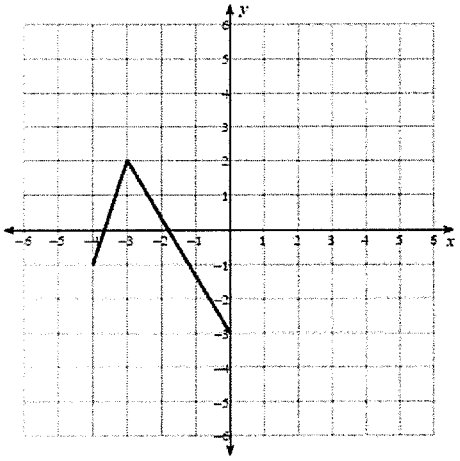
b. Use your graphing calculator to find the approximate value of x that maximizes the volume of the prism. Is this value reasonable?

5.1 Transformations of Functions, Pt 1

CA #1

Name: _____

Directions: a) Perform the translation on the given function (right on graph). B) Then, write g(x) in terms of f(x) after performing the given transformations.



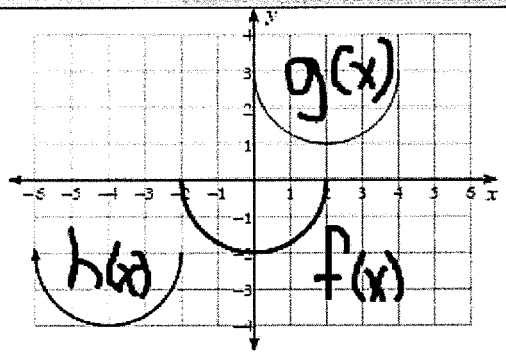
1a) Translate the graph 2 units to the left and 3 units down.

b) Write g(x) in terms of f(x).

2a) Translate the graph 4 units up.

b) Write g(x) in terms of f(x).

Directions: a) Describe the shift from f(x) to the given function. b) Write g(x) in terms of f(x) after performing the given transformations.



3a) Describe the shift from f(x) to g(x)

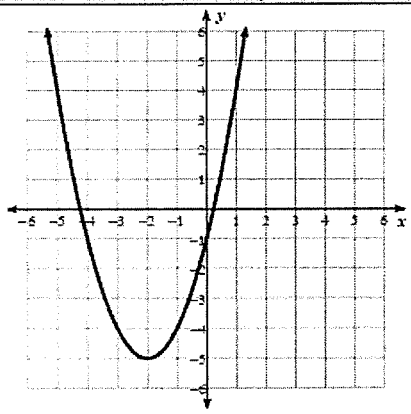
b) Write g(x) in terms of f(x).

4a) Describe the shift from f(x) to h(x)

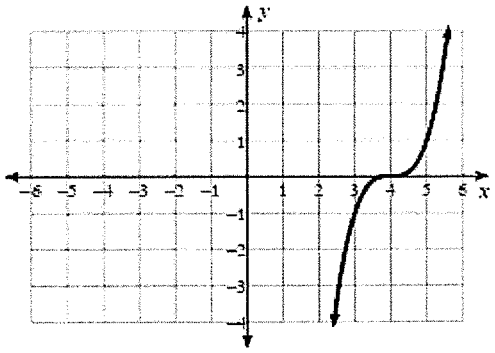
b) Write h(x) in terms of f(x).

Directions: Write the equation of each graph.

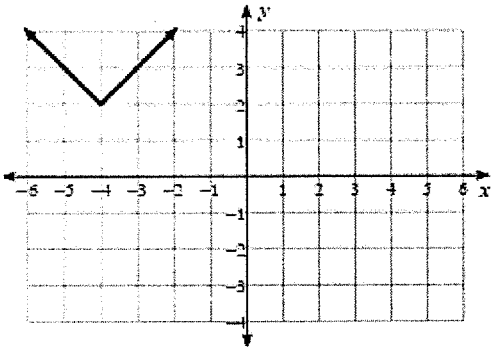
5)



6)



7)



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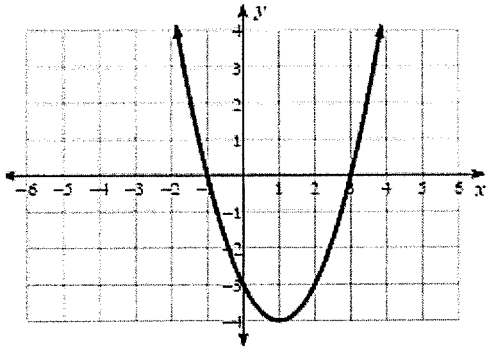
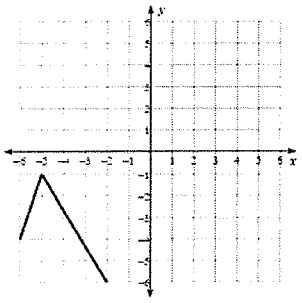
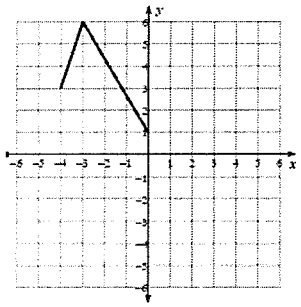


5.1Transformations of Functions, Pt 1

Corrective Assignment Answers

1a) 

1b) g(x) = f(x+2)-3

2a) 

2b) g(x) = f(x) + 4

3a) It shifts right two units and up three units. 3b) g(x) = f(x – 2) + 3

4a) It shifts left 4, and down 2. 4b) g(x) = f(x+4) – 2

5) $f(x) = (x + 2)^2 - 5$

6) $f(x) = (x - 4)^3$

7) $f(x) = |x + 4| + 2$

8) $f(x) = (x - 1)^2 - 4$

5.2 Transformations of Functions, Pt 2

CA #1

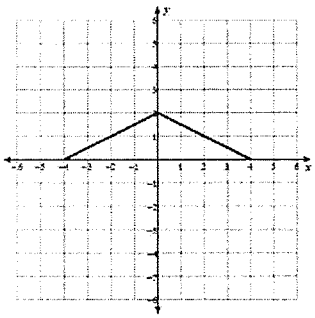
Name:_____

Directions: Describe all the transformations on the given function.

1) $f(x) = -\frac{1}{4}|x-5|+5$

2) $g(x) = (2(x-1))^3 - 5$

Directions: Write g(x) in terms of f(x) after performing the given transformation of the graph f(x).

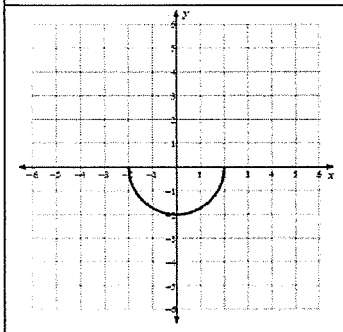


3a) Transform the graph with a vertical stretch of -2 and a horizontal shift of left 1.

3b) Write g(x) in terms of f(x).

4a) Transform the graph with a horizontal compression of $\frac{1}{2}$ and a vertical shift up 3.

4b) Write g(x) in terms of f(x).



5a) Transform the graph with a vertical stretch of -2 and a horizontal shift of left 1.

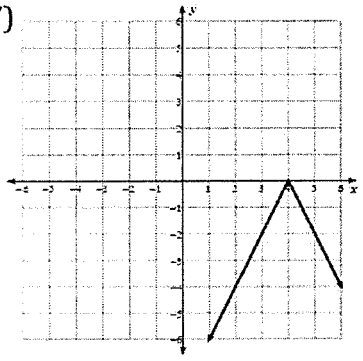
5b) Write g(x) in terms of f(x).

6a) Transform the graph with a horizontal stretch of 2 and a vertical shift up 3.

6b) Write g(x) in terms of f(x).

Directions: Write a function, g(x) that is a translation of the parent function.

7)



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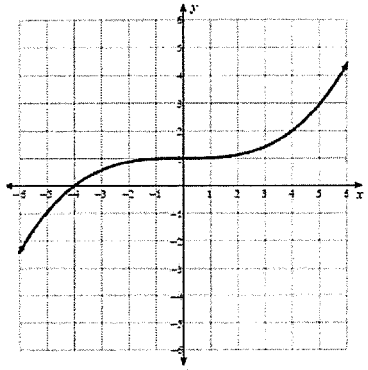

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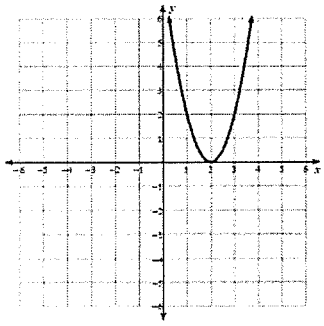

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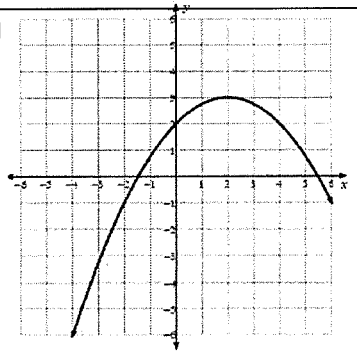
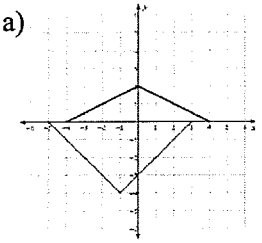


5.2 Transformations of Functions, Pt 2

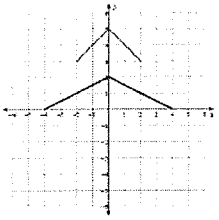
Corrective Assignment Answers

1) Vertical shift up 5, Horizontal shift right 5, vertical compression of 4, vertical reflection

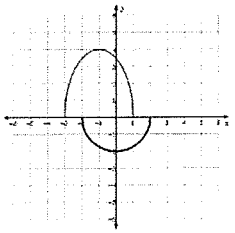
2) Vertical shift down 5, Horizontal shift right 1, horizontal compression of 2

3a) 

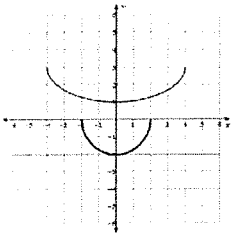
3b) $g(x) = -2 \cdot f(x+1)$

4a) 

4b) $g(x) = f(2x) + 3$

5a) 

5b) $g(x) = -2 \cdot f(x+1)$

6a) 

6b) $g(x) = f\left(\frac{1}{2}x\right) + 3$

7) $f(x) = -2|x-4|$

8) $f(x) = \left(\frac{1}{4}x\right)^3 + 1$

9) $g(x) = 2(x-2)^2$

10) $g(x) = -\left(\frac{1}{2}(x-2)\right)^2 + 3$

7.1 Rational Exponents

CA #1

Name:

Directions: Write each expression in exponential form.			
1) $\frac{1}{\sqrt{t}}$	2) $\sqrt{6+y}$	3) $\left(\sqrt[2]{5n}\right)^3$	4) $\left(\sqrt[3]{-64g}\right)^2$
Directions: Write each expression in radical form.			
5) $(x-9)^{1/3}$	6) $(-5x)^{3/5}$	7) $n^{-3/5}$	8) $(8y)^{-1/4}$

Simplify.			
9) $\sqrt[3]{-64}$	10) $\left(\sqrt[3]{-125}\right)^{-4}$	11) $81^{3/2}$	12) $(-81)^{3/2}$

13. The expression 64^x is equivalent to 16^y where ***x*** and ***y*** are both positive. Find the value of $\frac{x}{y}$?

Solve the following equations:

14. $2x^{\frac{2}{3}} - 7 = 11$

15. $25^{5x+7} = 125$

16. $16^{2x-1} = 64^{3x-4}$

17. $(x-5)^{\frac{2}{3}} = 4$

18. $10 = 8 + \sqrt[4]{2x-3}$

7.1 Rational Exponents

Corrective Assignment Answers

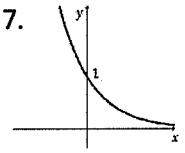
1. $t^{-\frac{1}{2}}$ 2. $(y+6)^{\frac{1}{2}}$ 3. $(5n)^{\frac{3}{2}}$ 4. $(-64g)^{\frac{2}{3}}$ 5. $\left(\sqrt[3]{x-9}\right)$ 6. $\left(\sqrt[5]{-5x}\right)^3$ 7. $\left(\frac{1}{\sqrt[5]{n^3}}\right)$ 8. $\frac{1}{\sqrt[4]{8y}}$ 9. -4 10. $\frac{1}{625}$

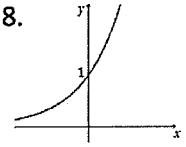
11. 729 12. No solution 13. $\frac{x}{y} = \frac{2}{3}$ 14. $x = 27$ 15. $x = -\frac{11}{10}$ 16. $x = 2$ 17. $x = 13$ 18. $x = \frac{19}{2}$

Name:_____ **CA #1** 7.2 Exp Growth and Decay

Tell whether the equation represents an exponential **growth** or an exponential **decay** function. Also, state thegrowth/decay factor, if possible.

1. $F(x) = -2(0.2)^x$
2. $F(x) = -5\left(\frac{4}{3}\right)^x$
3. $F(x) = -6\left(\frac{5}{3}\right)^x$
4. $F(x) = -3(23)^{-x}$

5. $F(x) = 8(4)^x$
6. $F(x) = 12(0.2)^x$
7. 

8. 

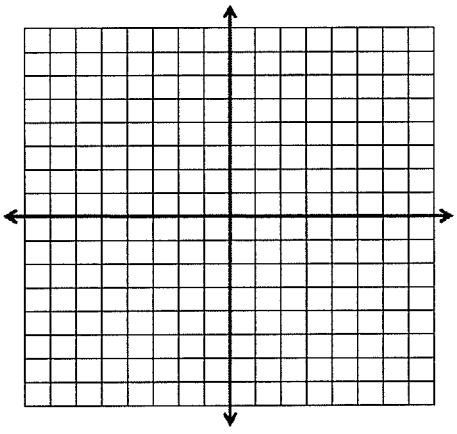
Sketch the graph of each exponential function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points** on each graph, and write the domain and range of each function.

9. $F(x) = -6\left(\frac{1}{3}\right)^x$

Growth or Decay?

Domain:

Range:

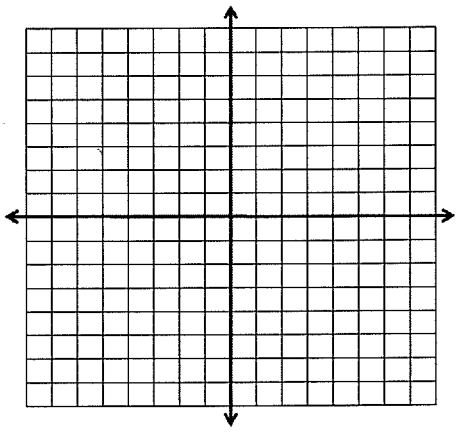


10. $F(x) = 6\left(\frac{2}{3}\right)^x$

Growth or Decay?

Domain:

Rang



9. The number of fish at a lake where the time is measured in weeks is modeled by the equation:

$$m(d) = 355(2.25)^d$$

a. How many fish are at the lake when the initial count was taken?

b. If this rate continues, how many fish will there be 10 weeks from now.

10. Mr. Brust collects vintage Transformers. He finds a rare Optimus Prime figure for $450. Each year, the value increase by a factor of 1.09.

a. Write a model for the value of the action figure.

b. How much will Optimus Prime be worth in 10 years?

Name:_____ **CA #1** 7.2 Exp Growth and Decay

Tell whether the equation represents an exponential **growth** or an exponential **decay** function. Also, state thegrowth/decay factor, if possible.

1. $F(x) = -2(0.2)^x$

Decay

DF: (0.2)

2. $F(x) = -5\left(\frac{4}{3}\right)^x$

GROWTH

GF: $\left(\frac{4}{3}\right)$

3. $F(x) = -6\left(\frac{5}{3}\right)^x$

GROWTH

GF: $\left(\frac{5}{3}\right)$

4. $F(x) = -3(23)^{-x}$

Decay

DF: (.043)

$(23^{-1})^x$

$\approx (.043)^x$

5. $F(x) = 8(4)^x$

GROWTH

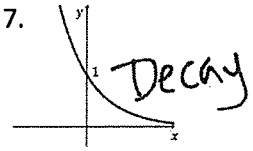
GF(4)

6. $F(x) = 12(0.2)^x$

Decay

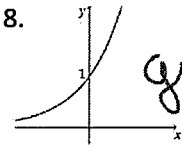
DF: (0.2)

7.



Decay

8.

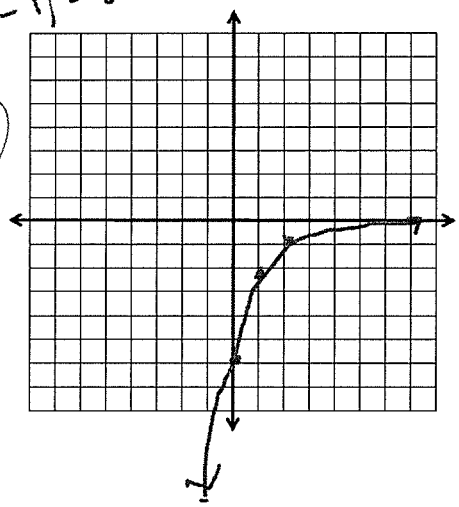


growth

Sketch the graph of each exponential function by doing the following: Sketch the asymptote, label at least **two distinct coordinate points** on each graph, and write the domain and range of each function.

9. $F(x) = -6\left(\frac{1}{3}\right)^x$

x	y
0	-6
1	-2
-1	-18



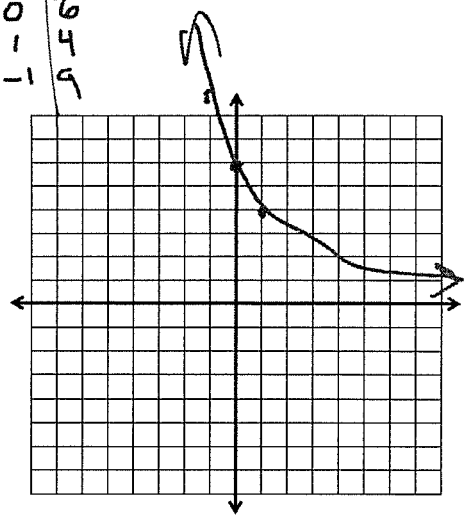
Growth or Decay?

Domain: ℝ

Range: $F(x) < 0$

10. $F(x) = 6\left(\frac{2}{3}\right)^x$

x	y
0	6
1	4
-1	9



Growth or Decay?

Domain: ℝ

Rang $F(x) > 0$

9. The number of fish at a lake where the time is measured in weeks is modeled by the equation:

$$m(d) = 355(2.25)^d$$

a. How many fish are at the lake when the initial count was taken?

355

b. If this rate continues, how many fish will there be 10 weeks from now.

1,180,466

10. Mr. Brust collects vintage Transformers. He finds a rare Optimus Prime figure for $450. Each year, the value increase by a factor of 1.09.

a. Write a model for the value of the action figure.

$F(x) = 450(1.09)^x$

b. How much will Optimus Prime be worth in 10 years?

$1065.31

7.4 Exponential Modeling

Corrective Assignment #1

For 1-8, use exponent properties to simplify. Your answer should contain only positive exponents

1. $e^{-2} \cdot e^{4}$
2. $-\dfrac{e^{2x}}{3e}$
3. $\dfrac{7e^{3x}}{e^{x}}$
4. $(3e^{-3x})^{2}$
5. $-4e^{2x} \cdot e^{-5}$
6. $\dfrac{e^{5x+2}}{e^{3x+3}}$
7. $(3e)^{-3}$
8. $(2e^{3x-4})^{3}$

For 9-12, use a calculator to evaluate the expression. Round the result to three decimal places.

9. $-4e^{2}$
10. $-e^{-2}$
11. $2e^{-4}$
12. $4e^{3}$

Compounding Interest (continuous compounding)	Compounding Interest (periodic compounding)	% increase/decrease per unit of time
$A = Pe^{rt}$	$A = P\left(1+\dfrac{r}{n}\right)^{nt}$	$f(x) = ab^{x}$

For 13 – 16, write a model for each scenario and use the model to calculate the value for the given number of years. (Not all problems involve compounding interest!)

13. You deposit \$7,000 in an account that pays 6% annual interest compounded continuously. How much will you have after 10 years?

14. Your recent purchase of baseball memorabilia is worth \$102, but increases by 3.3% every year. How much will it be worth after 20 years?

15. You deposit \$500 in an account that pays 8% annual interest compounded monthly. How much will you have after 15 years?

16. You deposit \$575 in an account that pays 4% annual interest compounded continuously. How much will you have after 5 years?

17. Functions of the form $P(t) = P_o e^{-rt}$ describe exponential decay, where r is the decay rate, P_o is the initial amount and t is time.

    Suppose a certain radioactive element has an annual decay rate of 13%. Starting with a 200 gram sample of the element, how many grams will be left in 3 years?

ANSWERS: 1. e^{2} 2. $-\frac{e^{2x-1}}{3}$ 3. $7e^{2x}$ 4. $\frac{9}{e^{6x}}$ 5. $-4e^{2x-5}$ 6. e^{2x-1} 7. $\frac{1}{27e^{3}}$ 8. $8e^{9x-12}$ 9. -29.556 10. -0.135 11. 0.037 12. 80.342

13. $7000e^{(0.06)(10)} \approx 12{,}754.83$ 14. $102(1.033)^{20} \approx \$195.26$ 15. $500500\left(1+\frac{0.08}{12}\right)^{12(15)} \approx \$1653.46$ 16. $575e^{(0.04)(5)} \approx \$702.31$ 17. 135.41g

8.1 Intro to Logs

CA #1

Name:_____

DIRECTIONS: Rewrite each exponential function as a logarithmic function.		
1) $8^3 = 512$	2) $2^{-6} = \frac{1}{64}$	3) $16^{\frac{1}{2}} = 4$
Rewrite each log as an exponential.		
4) $log_4 1024 = 5$	5) $log_{64} 4 = \frac{1}{3}$	6) $log_{\frac{1}{5}} 125 = -3$
Find the following logs by rewriting exponentially or explain why they don't make sense.		
7) $log_2 128$	8) $log_{\frac{1}{3}} 243$	9) $log 10000$
If $f(x) = log_2 x$, find the following.		
10) $f(8)$	11) $f\left(\frac{1}{64}\right)$	12) $f(\sqrt{8})$
Use your calculator to find the following logs to the nearest thousandth.		
13) $log_9 590$	14) $log_{21} 60$	15) $\ln 48$

8.1 Intro to Logs

Corrective Assignment Answers

1) $log_8 512 = 3$ 2) $log_2 \frac{1}{64} = -6$ 3) $log_{16} 4 = \frac{1}{2}$ 4) $4^5 = 1024$ 5) $64^{\frac{1}{3}} = 4$ 6) $\frac{1}{5}^{-3} = 125$

7) x = 7 8) x = -4 9) x = 4 10) x = 3 11) x = -6 12) x = $\frac{3}{2}$ 13) 2.904 14) 1.345 15) 3.871

8.2 Logarithmic Graphs

CA #1

Name:

Directions: Use the following function to answer questions 1-5.

$$f(x) = \log(x-2) + 2$$

1) x-intercept:	2) End Behavior:	3) Sketch and Label:
4) Vertical Asymptote:	5) Shifts:	

Directions: Use the following function to answer questions 6-10.

$$f(x) = \log_2(x+4) - 3$$

6) x-intercept:	7) End Behavior:	8) Sketch and Label:
9) Vertical Asymptote:	10) Shifts:	

Directions: Use the following function to answer questions 11-15.

$$f(x) = \log_3(x-3) + 1$$

11) x-intercept:	12) End Behavior:	13) Sketch and Label:
14) Vertical Asymptote:	15) Shifts:	

8.2 Logarithmic Graphs

Corrective Assignment Answers

Directions: Use the following function to answer questions 1-5.

$$f(x) = \log(x-2) + 2$$

1) x-intercept:

$0 = \log(x-2) + 2$

$-2 = \log(x-2)$

$10^{-2} = x - 2$

$10^{-2} + 2 = x$

$2.01 = x$

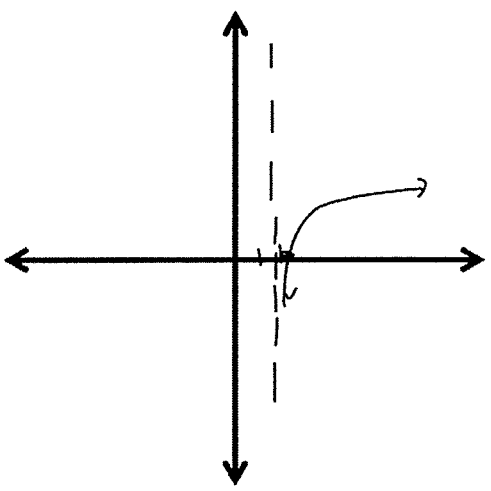
$(2.01, 0)$

2) End Behavior:

$x \to 2^+$, $f(x) \to -\infty$

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

3) Sketch and Label:



4) Vertical Asymptote:

$x - 2 = 0$

$x = 2$

5) Shifts:

Vertical shift up 2,

horizontal shift right 2.

Directions: Use the following function to answer questions 6-10.

$$f(x) = \log_2(x+4) - 3$$

6) x-intercept:

$0 = \log_2(x+4) - 3$

$3 = \log_2(x+4)$

$2^3 = x + 4$

$8 - 4 = x$

$4 = x$

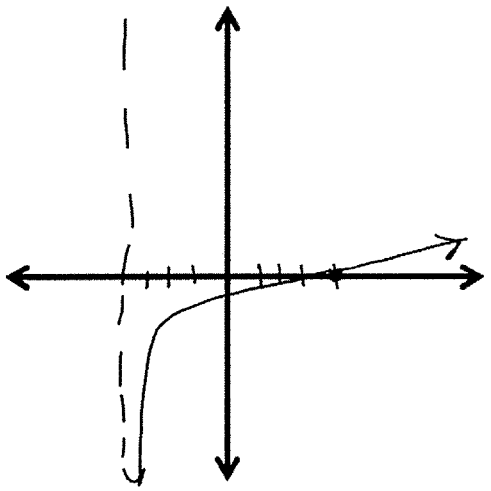
$(4, 0)$

7) End Behavior:

$x \to -4^+$, $f(x) \to -\infty$

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

8) Sketch and Label:



9) Vertical Asymptote:

$x + 4 = 0$

$x = -4$

10) Shifts:

Vertical shift down 3,

Horizontal shift left 4.

Directions: Use the following function to answer questions 11-15.

$$f(x) = \log_3(x-3) + 1$$

11) x-intercept:

$0 = \log_3(x-3) + 1$

$-1 = \log_3(x-3)$

$3^{-1} = x - 3$

$\frac{1}{3} + 3 = x$

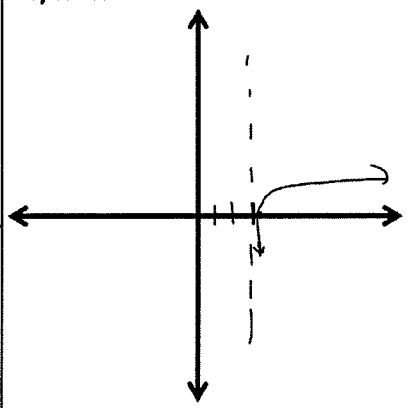
$(3\frac{1}{3}, 0)$

12) End Behavior:

$x \to 3^+$, $f(x) \to -\infty$

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

13) Sketch and Label:



14) Vertical Asymptote:

$(x-3) = 0$

$x = 3$

15) Shifts:

Vertical shift up 1,

horizontal shift right 3.

8.3 Properties of Logarithms

CA #1

Name: _____

Directions #1-3: Expand each logarithm.

1) $\log_2 4g$	2) $\log_5 x^4$	3) $\log \frac{h^4}{j}$

Directions #4-5: Condense each logarithm.

4) $2\log_4 x + 3\log_4 y$	5) $5\log_6 n - \log_6 m$

Directions #6-9: Simplify.

6) $\log_5 78.125 + \log_5 24 - \log_5 3$	7) $\log_2 8 + \log_2 192 - \log_2 3$
8) $\log_2 2^{x+3} + \log 10^8$	9) $\log_{(x+2)}(x+2)^{4x} - \log_7 7^{5x+2}$

8.3 Properties of Logarithms

Corrective Assignment Answers

1) $\log_2 4 + \log_2 g$ 2) $4\log_5 x$ 3) $4\log h - \log j$ 4) $\log_4 x^2y^3$ 5) $\log_6 \frac{n^5}{m}$

6) 4 7) 9 8) x + 11 9) –x - 2

8.4 Solving Exponential Equations

CA #1

Name: _____

Directions: Solve the equation. Give the EXACT and APPROXIMATE (to nearest thousandth) answers.	
1) $4^{2x} = 92$	2) $65 = 5^{2x+1}$
3) $7^{x+2} - 10 = 100$	4) $4(10^{x+10}) - 20 = 80$
5) $45(2^{2x}) = 2^{4x}$	6) $3(6^{x+1}) = 30(6^{2x+10})$

Compounding Interest (continuous compounding)	Compounding Interest (periodic compounding)	% increase/decrease per unit of time
$A = Pe^{rt}$	$A = P\left(1 + \frac{r}{n}\right)^{nt}$	$f(x) = ab^x$

7) Mr. Brust invests \$450 at 6% compounded monthly. How long will it take him to have \$1000 in his account?

8) Mr. Kelly invests \$450 at 6% compounded continuously. How many years will it take him to have \$1000?

9) The bee population is slowly dying in Kaiserslautern. Its population is decreasing by half every 6 months. If there are 10,000 bees right now, how long before there are only 500 bees left?

10) Mr. Sullivan spotted 15 mosquitos. He quickly realized the population was doubling every 3 days. How long until there are 1000 mosquitos?

8.4 Solving Exponential Equations

Corrective Assignment Answers

1) $x = \frac{\log_4 92}{2}$ $x \approx 1.631$	2) $x = \frac{\log_5 65 - 1}{2}$ $x \approx 0.797$	3) $x = \log_7 110 - 2$ $x \approx 0.416$
4) $x = \log 25 - 10$ $x \approx 8.602$	5) $x = \frac{\log_2 45}{2}$ $x \approx 2.746$	6) $x = -\log_6 10 - 9$ $x \approx -10.285$

7) 13.34 years	8) 13.31 years	9) 25.93 months	10) 18.18 days