9 Corrective Assignment – Exponents & Logarithms

Unit 9 Equations Any other equations not listed will be given in the application problem.	**Exponential Growth or Decay** $y = ab^x$	**Compounding Interest** $A = Pe^{rt}$ or $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$

Part 1 – #1-5 *No graphing calculator.*

1. Under each function, write "yes" if it is an **exponential** function. If the answer is "no", write an explanation why not.

    a) $y = -2\left(\frac{2}{7}\right)^x$ b) $y = 8(-6)^x$

2. Tell whether the equation or graph represents an exponential growth or exponential decay function.

    a) $y = 8\left(\frac{77}{13}\right)^{-x}$ b) $y = -3(e)^x$

3. Rewrite $\log_{169} 13 = \frac{1}{2}$ in exponential form.	4. Rewrite $6^{-1} = \frac{1}{6}$ in logarithmic form.	5. Evaluate $\log_2 32$

Part 2 – #6-23 *Graphing calculator is allowed.*

6. Give the **percent *increase*** or **percent *decrease*** for each equation.

    a) $y = 2.3(0.4)^x$ b) $y = 2(0.965)^x$

For 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.

7. $y = 3(2)^{x+1} - 4$

Domain: Range:

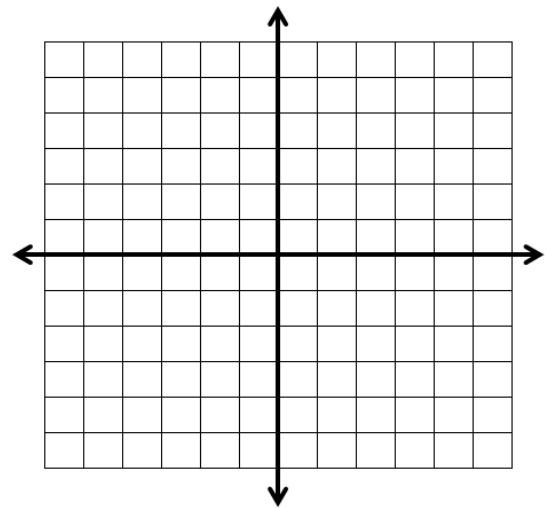8. $y = -3\left(\frac{1}{3}\right)^{x+5} + 7$

Domain: Range:

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

$$f(x) = \log_2(x - 3) + 1$$

Domain: Range:

10. Simplify $\dfrac{(e^3)^{-x}}{e^{-2x}}$. Your answer should contain only positive exponents.

11. Expand $\log_3 ab^3 \sqrt[4]{c}$

12. Condense to a single logarithm:

$$3 \log a - \log b - \frac{1}{5} \log c$$

13. Use a calculator to approximate $\log_{17} 105$ to three decimal places. *Show your work by using the change-of-base formula.*

For 14-16, solve each equation. If necessary, round answers to three decimal places.

14. $-9 + \log_{12} x = -8$	15. $6^{-5k} - 3 = 4$	16. $4 - 3 \cdot e^{9-2n} = -35$

17. You have discovered a new species of rodent which originates from upstate New York. It is a disgusting and filthy animal that is very difficult to eradicate, therefore it has been named Timkelliounous. This animal's population increases by 68% every year. How many Timkelliounouses will there be after 5 years if the current population is 100?

18. The area of a wound decreases exponentially with time. The area A of a wound after t days can be modeled by $A = A_0 e^{-0.05t}$ where A_0 is the initial wound area. If the initial would area is 3 square centimeters, what is the area after 10 days?

19. Newton's Law of Cooling:

$$T = T_s + (T_0 - T_s)e^{-kt}$$

Mr. Sullivan's car just overheated on the drive home from work and is stuck on the side of the road (I know...not very likely in Germany, but let's pretend.) It overheated at 300°F and can be driven again at 230°F. If $k = 0.0048$ and it is 65°F outside, how long (in minutes) does Mr. Coyour have to wait until he can continue driving?

20. If you have $1,000 in an account that pays 5% annual interest compounded continuously, how long (in years) would you have to wait for that $1,000 to become $5,000?

1. Below are graphs of $f(x) = x^2$ (thin line) and its translation (bold line). Write an equation of the translation.
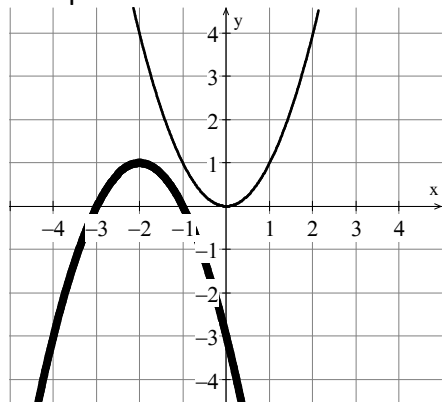
Simplify the fraction by rationalizing the denominator.

2. $\dfrac{4}{\sqrt{5}}$

3. $\dfrac{22}{5\sqrt{11}}$

Solve by factoring.

4. $x^3 - 15x^2 + 50x = 0$

5. $10x^2 + 19x - 56 = 0$

1. Simplify: $(3^{x-2})^{2x}$

(A) $(3)^{2x^2 - 4x}$
(B) $(3)^{3x-2}$
(C) $(9)^{2x^2 - 4x}$
(D) $(9)^{3x-2}$

2. If $f(x) = 10(2)^{3-2x} - 1$, find $f(3)$.

Answer Key – Unit 9 Corrective Assignment

1a) Yes.	1b) No. The base, b, must be a **positive** number other than one.	2a) Decay	2b) Growth	3) $169^{\frac{1}{2}} = 13$	4) $\log_6 \frac{1}{6} = -1$	5) 5

6a) 60% decrease	6b) 3.5% decrease	7)		8)		9)	
		Points: (0, 2), (-1, -1), (-2, -2.5)		Points: (-4, 6), (-5, 4), (-6, -2)		Points: (5, 2), (4, 1)	
		Domain: All real #'s	Range: $y > -4$	Domain: All real #'s	Range: $y < 7$	Domain: $x > 3$	Range: All real #'s

10) $\frac{1}{e^x}$	11) $\log_3 a + 3\log_3 b + \frac{1}{4}\log_3 c$	12) $\log \frac{a^3}{b\sqrt[5]{c}}$	13) $\frac{\log 105}{\log 17} \approx 1.642$	14) $x = 12$	15) $k = -0.217$	16) $n = 3.218$

17) 1,338 rodents	18) 1.82 square cm	19) 73.7 minutes	20) 32.2 years

Algebra Skillz:	1. $y = -(x+2)^2 + 1$	2. $\frac{4\sqrt{5}}{5}$	3. $\frac{2\sqrt{11}}{5}$	4. $x = 0, -5, -10$	5. $x = -\frac{7}{2}, \frac{8}{5}$

SAT Prep:	1. (A)	2. 1/4