

Math142 Week In Review # 3

Review: Logarithms $y = \log_b x \iff b^y = x$

The base must be **positive and not one**.

Change from logarithmic form to exponential form and solve.

Basic properties of Logarithms:

$$a^{\log_a x} = x, \text{ if } x > 0 \qquad 5^{\log_5 \star} = \star$$

$$\log_a a^x = x, \text{ for all } x. \qquad \log_3 3^\pi = \pi$$

$$\log_a xy = \log_a x + \log_a y$$

$$\log_a \frac{x}{y} = \log_a x - \log_a y$$

$$\log_a x^c = c \log_a x$$

1. Simplify each of the following:

a. $\frac{(-2e^{4x})^3}{e^x - 3e^x}$

b. $4^{x+5} \cdot 32^{2x}$

c. $2^x + 2^{2x}$

2. Solve the following equations:

a. $25^{x^2+2} = 125^{2x}$

b. $(2x + 1)^3 = (1 - x^2)^3$

c. $3xe^{-x} + 6x^2e^{-x} = 0$

d. $4^x \cdot 16^{x+2} = 64$

3. How much should Kyle invest in a CD which pays 4.25% if he will need \$38,000 in 8 yrs to replace his car:

a. if the CD is compounded quarterly?

b. if the CD is compounded continuously?

4. Let t represent the number of months since Mandy began studying Spanish. V represents the number of hundreds of vocabulary words that Mandy has learned. According to the model, $V(t) = 38(1 - 2e^{-0.3t}) + 36$, what is the approximate upper limit of words she can learn in Spanish?

5. The chart below lists the Yankees annual payroll salary. Define t as the number of years since 1980, and S as the payroll salary for the team in millions of dollars.

Year	Salary in millions of \$'s
1984	15
2000	95
2004	187
2008	209

Find the best fitting linear, quadratic, and exponential regression.

a. Which model is best for predicting the annual payroll salary for 2009?

b. What payroll salary does this model predict for 2009?

6. A model for the number of bacterial in a culture t hours after exposure is given by:
 $N(t) = 175e^{0.2t}$.
- What was the initial population?
- What was the population two days later?
7. Which of the functions below are 1 – 1?
- $y_1 = |x^2 - 16|$
 - $y_2 = (x - 3)^2 + 5, x \geq 0$
 - $y_3 = \sqrt{4 - 2x}$
 - $y_4 = e^{\ln(3x+1)}$
8. Rewrite in exponential form each of the following:
- $\log_2(x) = -1$
 - $\log(x + 1) = 0$
 - $\ln(2x) = 3$
9. Find the domain of:
- $f(x) = \log_2(16 - 8x)$
 - $g(x) = \ln(x^2 - 4)$
 - $h(x) = \frac{\log 12 - 3x}{\ln(x - 2)}$
10. Find the inverse of each of the following functions if they exist.
- $f(x) = \log(x - 5)$
 - $g(x) = x^3 - 3x^2 - 5x + 4$
 - $h(x) = 3e^{2x}$
11. If $\log_a 2 = 1.25, \log_a 3 = 2.5$ and $\log_a 5 = 13$, evaluate each of the following”
- $\log_a 1600$
 - $\log_a 60a^4$
12. Solve for x : $\log_b(x + 2) + \log_b(x) = \log_b 24$
13. Solve for x : $\log_2[\log_3(\ln(2x - 3))] = 1$