Name: _____ **Class:** _____

Honors Pre-Calculus Homework Packet: UNIT 3 Exponential and Logarithmic Functions

3.1 and 3.2

Determine whether the function represents exponential growth decay and find the percentage.

1. $P(t) = 4.3 \cdot 1.018^t$
2. $f(x) = 5607 \cdot 0.9968^x$
3. $g(t) = 43 \cdot 2^t$

Write an exponential function that represents the situation.

4. Initial value: 52, Increasing at a rate of 2.3% per day.

5. Initial value: 44, Tripling every 8 days.

6. Initial mass: 15g, Decreasing at a rate of 4.6% six times an hour.

Solve the following word problems.

7. The population of River City in the year 1910 was 4200. The population increased 2.25% every year.

    a. Find the population in 1930 and 1945

    b. Predict when the population reached 20,000

8. The Half-Life of a radioactive substance is 65 days. There are 3.5g initially.

    a. Write the exponential function

    b. How many days will it take for there to be 1g remaining?

9. The number of students infected with the flu at Springfield High School after t days is modeled by the function $(t) = \frac{800}{1+49e^{-0.2t}}$.

    a. What was the initial number of students infected with the flu?

    b. How many days will it take for there to be 200 students infected?

    c. School will close when 300 students have the flu. How many days will it this to happen?

The following table represents a logistic function. Find the equation.

10.

X	0	2	4	6	8	10
Y	92	108.9	128.2	150	174.2	200.8

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3.3 and 3.4

Simplify the following logarithmic functions without a calculator

1. $\log 10,000$
2. $\log 10^{-4}$
3. $\log \frac{1}{10^{-12}}$
4. $\ln e^3$
5. $\ln \frac{1}{\sqrt{e^7}}$

6. $\log \frac{1}{10000000}$
7. $\log \frac{1}{\sqrt[3]{10^5}}$

Describe the transformations of the functions from the basic functions $f(x) = \log x$ and $f(x) = \ln x$

8. $f(x) = \log(x-3) - 1$
9. $f(x) = -2\ln(x) + 7$

Expand each expression.

10. $\ln(9x)$ 11. $\log(1000x^4)$ 12. $\log\left(\frac{800}{x}\right)$ 13. $\ln(2x^2y^4)^3$ 14. $\ln(e^4x^{12}y^{16})$

Condense each expression.

15. $2\ln x + 3\ln y + 9\ln z$ 16. $5\log(x^3y^2)$ 17. $3\ln(x^3y) - 2\ln(xy^2)$

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3.5

Solve each exponential or logarithmic function algebraically.

1. $32\left(\frac{1}{4}\right)^{\frac{x}{3}} = 2$ 2. $3\left(4^{\frac{x}{2}}\right) = 96$ 3. $3\left(5^{-\frac{x}{4}}\right) = 15$ 4. $\log_2 x = 5$ 5. $\log_4(x-5) = -1$

6. $0.98^x = 1.6$ 7. $80e^{0.045x} = 240$ 8. $7 - 3e^{-x} = 2$ 9. $3 - \log(x+2) = 5$

10. $\frac{500}{1+25e^{0.3x}} = 200$ 11. $\ln(x+3) + \ln(x+4) = \ln 6$ 12. $\log(x-2) + \log(x+5) = 2\log 3$

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