Topic 6: Exponential and Logarithmic Functions Review Guide   Name: *Key*

DIRECTIONS: Determine if each of the following represents exponential growth or decay. Then state the y-intercept and identify the rate of growth or decay.

1) $f(x) = 100 \cdot 2.5^x$

~~GROWTH~~ or DECAY (circle one) *(GROWTH circled)*

Y-Intercept: 100

Rate: $1.5 \rightarrow 150\%$

2) $f(x) = 10{,}200 \cdot (0.6)^x$

GROWTH or ~~DECAY~~ (circle one) *(DECAY circled)*

Y-Intercept: $10{,}200$

Rate: $0.4 \rightarrow 40\%$

3) $f(x) = 12{,}000(0.7)^x$

GROWTH or DECAY (circle one)

Y-Intercept:

Rate:

4) $f(x) = 450 \cdot (1.7)^x$

GROWTH or DECAY (circle one)

Y-Intercept:

Rate:

5) The population of Medway, Ohio, was 4,007 in 2000. It was expected to decrease by about 0.36% per year.

a) Write an exponential decay function to model this scenario.

$P = 4007(0.9964)^t$

b) Use your exponential decay function from part (a) to determine the approximate population of Medway in 2020.

3728 ppl

DIRECTIONS: Find the amount in the account for the given principal, interest rate, time and compounding period.

6) P = 800, r = 6%, t = 9 years; compounded quarterly

$800\left(1 + \dfrac{.06}{4}\right)^{4 \cdot 9} = \$1{,}367.31$

7) P = 3,750, r = 3.5%, t = 20 years; compounded monthly

$3750\left(1 + \dfrac{.035}{12}\right)^{12 \cdot 20} = \$7{,}543.88$

8) P = 2400, r = 5.25%, t = 12 years; compounded semi-annually

9) P = 1,500, r= 4.5%, t = 3 years; compounded daily

10) P = 1,000, r = 2.8%, t = 5 years; compounded continuously

$$1000e^{.028 \times 5} = \$1150.27$$

11) P = 16,000, r = 4%, t = 25 years; compounded continuously

$$16000e^{.04 \times 25} = \$43492.51$$

12) Steve invests $1,800 in an account that earns 3.7% annual interest, compounded continuously What is the value in the account after 10 years?

13) Micah invests $5,280 in an account that earns 4.2% interest compounded monthly. What is the value of the account after 8 years?

DIRECTIONS: Rewrite each equation in either exponential or logarithmic form.

14) $3^8 = 6,561$

$$\log_3(6561) = 8$$

15) $\log_{10}(\frac{1}{100}) = -2$

16) $e^{-3} = 0.0498$

17) $\log_8(64) = 2$

$$8^2 = 64$$

18) $5^0 = 1$

$$\log_5(1) = 0$$

19) $\ln(148.41) = 5$

20) $7^3 = 343$

21) $\log_2\left(\frac{1}{32}\right) = -5$

$$2^{-5} = \frac{1}{32}$$

DIRECTIONS: Solve each equation. Round answers to the nearest hundredth, if needed.

22) $\log_3(7x + 6) = 3$

23) $2.75e^x = 38.6$

$$e^x = 1.036$$

$$\ln(1.036) = x$$

$$2.64 = x$$

24) $3\ln(3x - 1) = 6$

$$\ln(3x - 1) = 2$$

$$e^2 = 3x - 1$$

$$7.389 = 3x - 1$$

$$8.389 = 3x$$

$$2.796 = x \rightarrow x = 2.80$$

25) $10^{x+1} - 15 = 35$

26) $1.5e^{2x} + 3 = 30$

27) $\log(x - 3) = -3$

28) How long does it take for $250 to grow to $600 at 4% annual percentage rate compounded continuously. Round to the nearest year.

$250e^{.04t} = 600$ $\ln(2.4) = 0.4t$

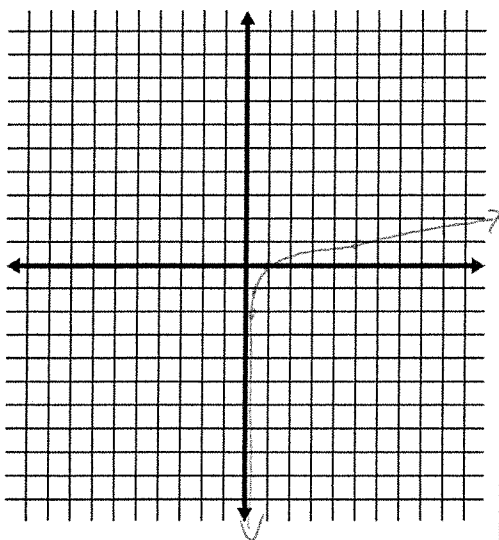$e^{.04t} = 2.4$ $0.875 = 0.4t$

                          $2.19 = t$

Sketch a graph of the following functions and then describe the key features. Make a table to help sketch the graph.

29) $y = \log_5(x)$

X	Y
$\frac{1}{25}$	-2
$\frac{1}{5}$	-1
1	0
5	1
25	2

Domain: $(0, \infty)$ or $x > 0$

Range: $(-\infty, \infty)$ or   All real #s

Intercept: $(1, 0)$
           x-int

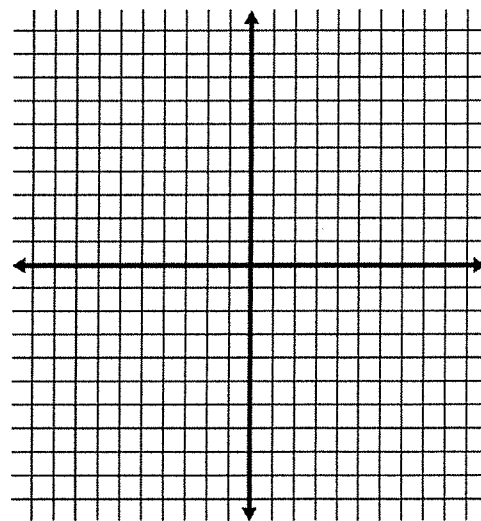Asymptote: y-axis $(x = 0)$

End Behavior:

As $x \to 0$ $f(x) \to -\infty$

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

30) $y = \log_2(x + 1) + 3$

X	Y

Domain:

Range:

Intercept:

Asymptote:

End Behavior:

DIRECTIONS: Find the equation of the inverse of each function.

31) $f(x) = 5^{x-3}$

$Y = 5^{x-3}$

$X = 5^{Y-3}$

$Y - 3 = \log_5(x)$

$Y = \log_5(x) + 3$

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

33) $f(x) = 6^{x+7}$

34) $f(x) = \log_2(8x)$

$Y = \log_2(8x)$
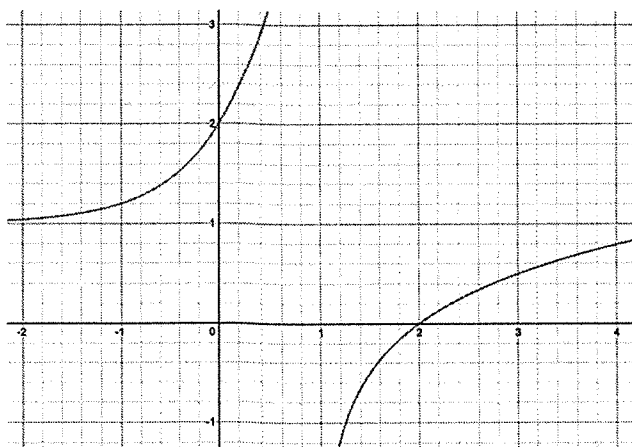
$X = \log_2(8y)$

$2^x = 8y$

$2^x \div 8 = y$

35) $f(x) = \ln(x + 3) - 1$

36) $f(x) = 4\log_2(x - 3) + 2$

37) How do you know if the graph of two functions are inverses of each other?

DIRECTIONS: Determine if the functions are inverses of each other. Explain your reasoning.

38)

39)