Name: _____ Date: _____

UNIT #5– EXPONENTIAL AND LOGARITHMIC FUNCTIONS
MATH III

Part I Questions

1. The expression $\left(\frac{1}{x^3}\right)^2$ is equivalent to

(1) x^{-1} (3) x^{-5}

(2) $x^{2/3}$ (4) x^{-6}

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2. For the function $f(x) = 5(2)^x + 7$, which of the following represents its *y*-intercept?

(1) 7 (3) 12

(2) 5 (4) 17

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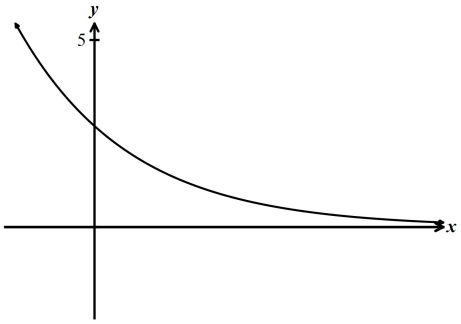
3. Which of the following could be the equation of the graph shown below?

(1) $y = 10(0.5)^x$

(2) $y = 3(0.75)^x$

(3) $y = 4(1.25)^x$

(4) $y = 5(2.2)^x$



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4. A population of fruit flies is increasing at a rate of 22.5% per hour. If the population had an original size of 10 flies, then which of the following is its size after one day?

(1) 798 (3) 1122

(2) 935 (4) 1304

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5. The water level in a draining reservoir is changing such that the depth of water decreases by 7.5% per hour. If the water starts at a depth of 45 feet, then which of the following functions properly models the depth, *d*, as a function of time, *t*, in hours since it started draining?

(1) $d = 45(.075)^t$ (3) $d = 45(7.5)^t$

(2) $d = 45(.925)^t$ (4) $d = 45(92.5)^t$

6. The temperature of a cooling liquid in a room held at a constant 75 degrees Fahrenheit can be described by the equation $F(t) = 132(.97)^t + 75$, where F is the Fahrenheit temperature and t is the amount of time it has been cooling, in minutes. Which of the following was the original temperature of the liquid when it began cooling?

(1) 75 (3) 203

(2) 132 (4) 207

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7. If a 100 person population grows at a constant rate of 2.8% per year, then by how many people will be in the population in 10 years?

(1) 117 (3) 132

(2) 128 (4) 139

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8. Which of the following is closest to the value of $\log_4(40)$?

(1) 1.8 (3) 2.7

(2) 2.3 (4) 3.5

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9. If $b > 0$ then $\log_b\left(\frac{1}{b^3}\right)$ is equal to

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

(2) $\frac{b}{3}$ (4) -3

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10. If $\log_b(5) = 1.2$ then $\log_b(125) =$?

(1) 0.4 (3) 3.6

(2) 1.728 (4) 30

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11. If \$500 is placed in a savings account that earns a 6% nominal interest compounded monthly, then which of the following represents the account's worth after 10 years?

(1) \$800.00 (3) \$895.42

(2) \$873.29 (4) \$909.70

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Expand each logarithm.

12) $\log \frac{a^4}{b^4}$

13) $\log \sqrt{x \cdot y \cdot z}$

14) $\log \frac{x^3}{y^6}$

15) $\log \left(\frac{a}{b^4}\right)^3$

Condense each expression to a single logarithm.

16) $10 \log_3 12 + 5 \log_3 11$

17) $\log x + \log y + 3 \log z$

18) $18 \log a + 3 \log b$

19) $8 \log_8 7 - 4 \log_8 2$

Solve each equation.

20) $\log_6 x = 1$

21) $6 + \log_{11} (a - 7) = 8$

22) $\log (3n + 10) = \log 5n$

23) $\log_{11} (16 - a) = \log_{11} (a^2 + 5a)$

24) $\log_7 2x - \log_7 5 = \log_7 60$

25) $\log (x - 5) - \log 6 = 1$

Solve each equation. Round your answers to the nearest hundredth.

26) $11^n = 47$

27) $3^{-7n} - 8 = 61$

Solve each word problems. Show each equation used.

28) The yearly profits of a company is $25,000. The profits have been decreasing by 6% per year. What will be the profits in 8 years? Round your answer to the nearest dollar.

29) A thousand dollars is left in a bank savings account drawing 7% interest, compounded quarterly for 10 years. What is the balance at the end of that time?

30) How much would $1000 invested at a nominal 2% yearly rate, compounded monthly, be worth in 20 years?

31) Maria invests $6,154 in a savings account with a fixed annual interest rate of 8% compounded continuously. What will the account balance be after 10 years?