

**I. Write the equation in exponential form. Do NOT evaluate.**

1.  $\log_5 47 = x$  \_\_\_\_\_ 2.  $\ln 9 = z$  \_\_\_\_\_

**II. Write the equation in logarithmic form. Do NOT evaluate.**

3.  $7^3 = x$  \_\_\_\_\_ 4.  $e^{5x} = k$  \_\_\_\_\_

**III. Evaluate each expression. Write your answer in the blank space. Round your answer to 2 decimal places. NO CALCULATOR**

5.  $\log_8 \sqrt{32}$                       6.  $\log\left(\frac{1}{1000}\right)$                       7.  $\log_3 81$

5. \_\_\_\_\_ 6. \_\_\_\_\_ 7. \_\_\_\_\_

8.  $\ln e^7$                               9.  $\log_4 1$

8. \_\_\_\_\_ 9. \_\_\_\_\_

**IV. Solve each equation. Show your work. Round your answer to 2 decimal places.**

11.  $5^{4x+6} = 23$                       12.  $\frac{1}{2}e^{0.26t} + 10 = 44$                       13.  $20e^{-4t} = 160$

11. \_\_\_\_\_ 12. \_\_\_\_\_ 13. \_\_\_\_\_

14.  $3^{6x-3} = 6$                       15.  $\log(t-20) = 3$                       16.  $3 \ln(2-x) - 7 = 2$

14. \_\_\_\_\_ 15. \_\_\_\_\_ 16. \_\_\_\_\_

**VI. Solve the following problems. Be sure to first include the formula you will use for the problem, then show all of your work! Round your answer to 2 decimal places. Please circle or box your final answer!**

17. The number of a certain species of fish is modeled by the function  $n(t) = 23e^{0.053t}$  where  $t$  is measured in years and  $n(t)$  is measured in millions.

- a) Express as a percentage, the rate of growth of the fish population. \_\_\_\_\_
- b) What was the initial fish population? \_\_\_\_\_
- c) What will the fish population be after 7 years? Show your work! \_\_\_\_\_

18. Ashley will be buying a car for \$24000 in five years. How much money should she ask her parents for now so that, if she invests at 8.2% compounded continuously, she will have enough to buy the new car?

19. Suppose that \$6,045 is invested in a savings account paying 7.25% interest per year.
- Write the formula for the amount in the account after  $t$  years if interest is compounded semiannually.
  - Find the amount in the account after 5 years. \_\_\_\_\_
  - How long will it take for the amount in the account to grow to \$9,500?
20. A sum of \$1475 was invested for six years and the interest was compounded monthly. If this sum amounted to \$4832.46 after the given time, what was the interest rate? Show your work!
21. Find a function that models the rabbit population in a North Carolina county after 1996. Assume that the population grows continuously. In 1996, the population was 20,000 rabbits and in 2000 the population was 53,000. Find the rate of growth.
- In what year will the population reach 100,000?
22. The half life of radium-226 is 5 days. After 25 days a sample has been reduced to 0.375 g.
- What was the initial mass of the sample?
  - After how many days will only 0.15 g remain?
23. What interest rate is required for an investment with continuously compounded interest to double in 20 years?
24. How long does it take for an investment to double in value if it is invested at 5% compounded weekly ( $n=52$ )?

Find the inverse of the following:

25.  $f(x) = \frac{2}{3}x - 16$

26.  $f(x) = \sqrt{x + 4} - 5$

27.  $f(x) = x^2 - 12x + 2$