

1. Solve  $2^{-x} = 16$  and  $2^{-x} = 14$  for  $x$ . Check your answerers. \_\_\_\_\_
2. Calculate  $\log 10,000$ ,  $\ln 300$ ,  $\log_3 45$ . \_\_\_\_\_
3. Assume that  $\log_b 3 = 0.613$  and  $\log_b 5 = 0.898$  for some base  $b$ . Evaluate  $\log_b 15$ . \_\_\_\_\_
4. Write  $\log(x - 1) + \log(x + 1)$  as the logarithm of a single quantity. \_\_\_\_\_
5. Express the equation  $5^3 = 125$  in logarithmic form. \_\_\_\_\_
6. Express the equation  $\log_2 16 = 4$  in exponential form. \_\_\_\_\_
7. \$1500 is deposited in a savings account with an annual interest rate of 7.5%. If the interest is compounded continuously, how long will it take for the value of the account to be \$3000, \$4500 ?
8. Solve  $3^{x+2} = 93$  for  $x$  and write your answer in two decimal places.
9. Solve  $\log(x - 3) = 1$  for  $x$  and check your answer.
10. The population of certain city was 15000 in 1995 and has been growing exponentially at the relative growth rate of 1.7 % per year. (hint: exponential growth model is given by  $P(t) = 15000e^{.017t}$ )
  - i) Estimate the population in the year 2001. \_\_\_\_\_
  - ii) At what year will the population reaches 40,000 \_\_\_\_\_
11. Solve the equation  $\log(x - 3) + \log(x + 6) = 1$ . (Don't forget to check your answer(s)).
12. Determine the hydrogen ion concentration of a sample of blood with  $\text{pH} = 7.41$
13. How long will it take \$6000 to triple if it is invested in a savings account that pays 5.5% annual interest compounded continuously? Round to the nearest year.
14. Find the present value of \$10,000 if interest is paid at a rate of 9% per year, compounded semiannually, for three years.
15. Find the amount invested at an annual interest rate of 9% if after 5 years of continuous compounding, the balance is \$18,819.75.
16. The number of fish of a certain species is given by the formula  $n(t) = 12e^{0.012t}$  where  $t$  is measure in years and  $n(t)$  is measured in millions.
  - (a) What is the relative growth of the fish population? Express your answer as a percentage. \_\_\_\_\_
  - (b) What is the population of fish in ten years? \_\_\_\_\_
  - (c) How long will it take to 20 million fish? \_\_\_\_\_
  - (d) How long will it take to 40 million fish? \_\_\_\_\_
17. An earthquake has a energy of  $1.78 \times 10^{15}$  joules. Find its measure on the Richter scale in two decimal places.