

## SUPPLEMENTARY EXERCISES WITH LOGARITHMS

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- 1) Which numbers  $x$  satisfy the equation:  $(\log_3 x)(\log_x 5) = \log_3 5$  ?
- 2) Suppose that the Canadian dollar loses 5% of its value each year. How many years are needed in order that the Canadian dollar to lose 90% of its value ? (That is, the future value of the dollar to become the present value of a dime.)
- 3) Simplify the product:  $P = (\log_2 3)(\log_3 4)(\log_4 5) \dots (\log_{31} 32)$
- 4) If  $p = \frac{\log_b (\log_a a^2)}{\log_b a}$  find  $a^p$
- 5) If  $\log_b (xy) = 11$  and  $\log_b (x/y) = 5$ , what is  $\log_b x$ ?
- 6) Positive integers  $A, B$ , and  $C$ , with no common factor greater than 1, exist such that  $A \log_{200} 5 + B \log_{200} 2 = C$ . What is  $A + B + C$ ?
- 7) What is the value of  $25^{\frac{1}{2} - \log_5 \sqrt{2}}$ ?
- 8) A computer manufacturer finds that when  $x$  millions of dollars are spent on research, the profit,  $P(x)$ , in millions of dollars, is given by  $P(x) = 20 + 5 \log_3 (x + 3)$ . How much should be spent on research to make a profit of 40 million dollars?
- 9) Solve the system of equations  $y = \log_2 2x$  and  $y = \log_4 x$ .
- 10) Solve the equation  $\log_3 (x-2) + \log_3 10 = \log_3 (x^2 + 3x - 10)$
- 11)  $\log_2 (9-2^x) = 3 - x$

Answers:

- 1) all  $x > 0, x \neq 1$       2) about 45 years      3)  $P = 5$       4)  $a^p = 2$   
 5) 8    6) 6    7)  $5/2$     8) 78 million    9)  $(1/4, -1)$     10)  $x = 5$     11) 0, 3