

## Math 1130 Exam 2 Review

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

**Provide an appropriate response.**

1) Write the following in terms of  $\ln x$ ,  $\ln(x - 3)$ , and  $\ln(x + 1)$ :  $\ln[x\sqrt[3]{(x - 3)(x + 1)^2}]$  1) \_\_\_\_\_

2) Write the following in terms of  $\ln x$ ,  $\ln(x - 3)$ , and  $\ln(x + 1)$ :  $\ln \frac{x(x - 3)^2}{\sqrt{x + 1}}$  2) \_\_\_\_\_

3) Find the inverse of the function:  $f(x) = (x - 3)^2$ , for  $x \geq 3$  3) \_\_\_\_\_

4) Find  $x$ :  $\log_6 36 = x$  4) \_\_\_\_\_

5) Find  $x$ :  $\log_x 16 = 4$  5) \_\_\_\_\_

6) Find  $x$ :  $\log_x(4x - 3) = 2$  6) \_\_\_\_\_

7) Find  $x$  and express your answer in terms of natural logarithms:  $2e^{3x} = 6$  7) \_\_\_\_\_

8) The magnitude (Richter Scale) of an earthquake is given by  $R = \log\left(\frac{I}{I_0}\right)$  where  $I$  is the 8) \_\_\_\_\_

intensity of the earthquake and  $I_0$  is the intensity of a zero-level reference earthquake.  $\frac{I}{I_0}$

represents how many times greater the earthquake is than the reference earthquake. Find the magnitude of an earthquake that is 200 times the intensity of a zero-level earthquake.

9) Assume that  $\log 5 = 0.6690$ . Determine the value of  $\log \sqrt[3]{5}$ . 9) \_\_\_\_\_

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

10) If  $\ln x + \ln 2 = \ln 5$ , then  $x =$  10) \_\_\_\_\_  
A)  $\frac{2}{5}$ .      B)  $\frac{1}{3}$ .      C) 3.      D)  $\sqrt{5}$ .      E)  $\frac{5}{2}$ .

11) If  $\log_4(x + 6) = 2 - \log_4 x$ , then  $x =$  11) \_\_\_\_\_  
A) -4.      B) 8.      C) 10.      D) 2.      E) 4.

**SHORT ANSWER.** Write the word or phrase that best completes each statement or answers the question.

12) Solve for  $x$ :  $e^{2\ln(2x)} = 4$  12) \_\_\_\_\_

13) Write  $\log_2(x + 4)$  in terms of common logarithms. 13) \_\_\_\_\_

14) Solve for  $x$ :  $\log(x + 1) - \log(x - 2) = 1$  14) \_\_\_\_\_

- 15) Solve for  $x$ :  $\log_2(x - 4) + \log_2 3 = \log_2 x$  15) \_\_\_\_\_
- 16) Solve for  $x$ :  $4^{x+1} = 8^{3x}$  16) \_\_\_\_\_
- 17) Solve for  $x$ :  $(2 + x)^5 = 129.3$  17) \_\_\_\_\_
- 18) Find the effective rate that corresponds to an interest rate of 5% compounded daily. 18) \_\_\_\_\_
- 19) Over a period of 3 years, an original principal of \$1000 accumulated to \$1200 in an account where the interest rate was compounded monthly. Determine the rate of interest to two decimal places. 19) \_\_\_\_\_
- 20) An initial investment of \$2600 grows at an annual rate of 7.5% compounded monthly. Find how long it takes for the investment to amount to \$3500. 20) \_\_\_\_\_
- 21) An investment is growing at an effective rate of 12.4%. If the amount invested is currently \$12,000, what will the amount be in 6 years? 21) \_\_\_\_\_
- 22) A debt of \$2000 due four years from now is to be repaid by a payment of \$1000 now and a second payment at the end of two years. How much should the second payment be if the interest rate is 5% compounded annually? 22) \_\_\_\_\_
- 23) For an initial investment of \$10,000, suppose a company guarantees the following cash flow the end of the indicated years:
- | Year | Cash Flow |
|------|-----------|
| 1    | \$4000    |
| 3    | \$8000    |
- Assume an interest rate of 5% compounded annually. (a) Determine the net present value of the cash flows. (b) Is the investment profitable? 23) \_\_\_\_\_
- 24) Find the present value of \$3000 due after five years if the interest rate is 9.6% compounded semiannually. 24) \_\_\_\_\_
- 25) A debt of \$12,000, which is due 10 years from now, is instead to be paid off by four payments: \$3000 now, \$2000 in 3 years, \$2000 in 6 years, and a final payment at the end of 8 years. What would this payment be if an interest rate of 5.5% compounded semiannually is assumed? 25) \_\_\_\_\_
- 26) Suppose that Tori can invest \$13,000 in a business that guarantees her the following cash flows: \$6000 at the end of 2 years, \$5000 at the end of 4 years, and \$4000 at the end of 6 years. Assuming an interest rate of 6% compounded monthly, find the present value of the cash flows. Is the investment profitable? 26) \_\_\_\_\_
- 27) If \$200 is deposited into a savings account that earns interest at an annual rate of 8% compounded continuously, find the value of the account at the end of two years. 27) \_\_\_\_\_
- 28) Determine the effective rate equivalent to an annual rate of 10% compounded continuously. 28) \_\_\_\_\_

- 29) Determine the effective rate equivalent to an annual rate of  $7\frac{3}{4}\%$  compounded continuously. 29) \_\_\_\_\_
- 30) At an annual rate of 4% compounded continuously, in how many years would it take for a principal to double? 30) \_\_\_\_\_
- 31) If a person deposits \$1000 in a savings account that pays an interest rate of  $r\%$  compounded continuously, and the account has \$1400 at the end of 4 years, find the interest rate. 31) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

**Find a general term,  $(a_k)$ , that fits the displayed terms of the given sequence.**

- 32) 1, 5, 9, 13, 17 32) \_\_\_\_\_
- A)  $(4k + 3)_{k=1}^5$       B)  $(4k - 3)_{k=1}^5$       C)  $(4k + 3)_{k=0}^4$       D)  $(4k - 3)_{k=0}^4$

**Write the first five terms of the arithmetic sequence with the given first term  $a$  and common difference  $d$ .**

- 33)  $a = 21; d = -5$  33) \_\_\_\_\_
- A) 0, 21, 16, 11, 6      B) -21, -16, -11, -6, -1
- C) 21, 16, 11, 6, 1      D) 25, 19, 13, 7, 1

**Write the first five terms of the geometric sequence with the given first term  $a$  and common ratio  $r$ .**

- 34)  $a = 6; r = \frac{1}{3}$  34) \_\_\_\_\_
- A)  $2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \frac{2}{81}$       B)  $6, \frac{19}{3}, \frac{20}{3}, 7, \frac{22}{3}$
- C) 6, 18, 54, 162, 486      D)  $6, 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}$

**Determine the first five terms of the geometric sequence.**

- 35)  $a_1 = 6, r = -5$  35) \_\_\_\_\_
- A) -5, -30, 150, -750, 3750      B) 6, 1, -4, -9, -14
- C) 6, -30, 150, -750, 3750      D) 6, 30, 150, -750, 3750

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

**Provide an appropriate response.**

- 36) Suppose a person deposits \$1000 in a savings account at the end of every six months. What is the value of the account at the end of five years if interest is at a rate of 10% compounded semiannually? 36) \_\_\_\_\_
- 37) A person establishes the following retirement plan: an immediate deposit of \$10,000 and quarterly payments of \$1,500 at the end of each quarter into a savings account that earns 5% compounded quarterly, what is the amount of the investment after 21 years? 37) \_\_\_\_\_

- 38) Suppose an annuity *due* consists of 6 yearly payments of \$200 and the interest rate is 5% compounded annually. Determine (a) the present value and (b) the future value at the end of 6 years. 38) \_\_\_\_\_
- 39) Suppose Lena deposits \$500 at the beginning of every month into a bank account that pays 5.4% compounded monthly. After five years, how much will she have? 39) \_\_\_\_\_
- 40) A 20-year loan for \$100,000 is to be amortized by equal semiannual payments. If interest is at the nominal rate of 10% compounded semiannually, find (a) the semiannual payment; (b) the interest in the first payment; (c) the principal repaid in the first payment. 40) \_\_\_\_\_
- 41) A person purchased a television set for \$850 and agreed to pay it off by monthly payments of \$50. If the store charges an interest rate of 9% compounded monthly, how many months will it take to pay off the debt? 41) \_\_\_\_\_
- 42) Mary amortizes a loan of \$80,000 for a new home by obtaining a 15-year mortgage at the rate of 9.9% compounded monthly. Find (a) the monthly payment, (b) the total interest charges, and (c) the principal remaining after 8 years. 42) \_\_\_\_\_

Answer Key

Testname: MATH 1130 EXAM 2 REVIEW (AU 17)

- 1)  $\ln x + \frac{1}{3}[\ln(x - 3) + 2 \ln(x + 1)]$
- 2)  $\ln x + 2 \ln(x - 3) - \frac{1}{2} \ln(x + 1)$
- 3)  $f^{-1}(x) = \sqrt{x} + 3$
- 4) 2
- 5) 2
- 6) 1, 3
- 7)  $\frac{\ln 3}{3}$
- 8) approximately 2.3
- 9) 0.2230
- 10) E
- 11) D
- 12) 1
- 13)  $\frac{\log(x + 4)}{\log 2}$
- 14)  $\frac{7}{3}$
- 15) 6
- 16)  $\frac{2}{7}$
- 17)  $x = .6443547$
- 18) 5.1267%
- 19) 6.09%
- 20) 4 years
- 21) \$24,198
- 22) \$711.56
- 23) (a) \$720.23                      (b) yes
- 24) \$1877.19
- 25) \$1282.91
- 26) -\$948.19; no
- 27) \$234.70
- 28) 10.52%
- 29) 8.058223%
- 30) 17.3
- 31) 8.4118059%
- 32) B
- 33) C
- 34) D
- 35) C
- 36) \$12,577.89
- 37) The amount of the investment is \$249,084.69 after 21 yrs.
- 38) (a) \$1065.90                      (b) \$1428.40
- 39) \$34,506.95
- 40) (a) \$5827.82                      (b) \$5000.00                      (c) \$827.82
- 41) 18.25 months, approximately
- 42) (a) \$854.80                      (b) \$73,864                      (c) \$51,650.92