

MAT 107 Review for Test 4 Chapter 4

1. Given $f(x) = 2x - 4$ and $g(x) = 5 - x$ find $(f \circ g)(x)$
2. Given $f(x) = \begin{cases} x^2 - 4, & \text{if } x < 3 \\ 4, & \text{if } x \geq 3 \end{cases}$, find $(f \circ f)(2.5)$
3. Given $f(x) = \sqrt[3]{x+2}$ and $g(x) = x^3 - 3$, find $(g \circ f)(x)$
4. Find the inverse of the function $\{(2, -3), (1, 5), (0, 2)\}$
5. Find the equation of the inverse of (a) $f(x) = 1 - x^3$ (b) $f(x) = \frac{2}{x+3}$
6. Given $f(x) = \sqrt[5]{\frac{2x-7}{3x+4}}$ find $f(f^{-1}(1253))$
7. Write the equation for the graph of $f(x) = 3^x$ to the left 2 places and down 5.
8. Evaluate $e^{1.235}$
9. For a certain secretarial student, the number N of words typed per minute is a function of the time t in hours that the student has practiced and is given by $N(t) = 60(1 - e^{-0.05t})$. What is the student's rate of typing after 10 hours of practice?
10. Use a grapher to find the intersection of the two graphs $y_1 = 2e^x - 3$ and $y_2 = 5.8$
11. Determine the range of $f(x) = e^x - 4$
12. Find the value of $\log_3 15$
13. Simplify $\log_4 4^{x-3}$
14. It is determined that the retention rate for a student memorizing a list of phone numbers is given by $R(t) = 100 - 31 \log(36t + 1)$ for $0 \leq t \leq 7$ where t is time in days. What percentage of the learned material is retained after 6 hours?
15. Convert $\log_3 2 = x$ to an exponential equation.
16. Convert $\ln y = t$ to an exponential equation.
17. Convert $B^W = p$ to a logarithmic equation.
18. Convert $e^t = m$ to a logarithmic equation.
19. Express as a single logarithm and simplify, if possible: $\frac{1}{3} \log 27 - 2 \log 3 + \log 4$
20. Express in terms of sums and differences of logarithms $\ln \frac{x^2 \sqrt{w}}{y^3}$
21. Given that $\log_a 2 = 0.4307$ and $\log_a 3 = 0.6826$ find $\log_a 24$
22. Solve for x : $3^{x-2} = 2^{-x}$
23. Solve for x : $e^{x-1} = 3^x$
24. Solve for x : $\log_3 x + \log_3 (x - 6) = 3$
25. Solve for x : $\log_4 (x + 12) - \log_4 (x - 3) = 2$
26. Solve for x using a grapher: $3 \ln(2x + 1.3) = 3.6$
27. \$10,000 is invested in an account earning 7.5% compounded continuously. How long will it take the account to reach \$50,000? ($P(t) = P_0 e^{kt}$)
28. What is the doubling time on an investment earning 5.4% compounded continuously?

Multiple Choice

29. Determine which of the following functions is one-to-one:

- (A) $f(x) = |x - 3|$ (B) $f(x) = x^2 + 3$ (C) $f(x) = \frac{2}{x + 3}$ (D) $f(x) = x^4$

30. Find an equation for the inverse of $f(x) = 2x - 7$

- (A) $f^{-1}(x) = \frac{1}{2x - 7}$ (B) $f^{-1}(x) = \frac{x}{2} + 7$ (C) $f^{-1}(x) = -2x + 7$
(D) $f^{-1}(x) = 7x + 2$ (E) $f^{-1}(x) = \frac{x + 7}{2}$

31. Determine the range of $y = 3^{-x}$

- (A) $(-\infty, \infty)$ (B) $[0, \infty)$ (C) $(0, \infty)$ (D) $(-\infty, 0)$ (E) $(0, 1)$

32. Given that $\log_b 2 = 0.4307$ and $\log_b 3 = 0.6826$ find $\log_b 18$

- (A) 0.2007 (B) 1.7959 (C) 0.1266 (D) 4.0956 (E) 1.544

33. Simplify $3 + \ln e^{5x}$

- (A) $\ln 15x$ (B) $\ln 3 + 5x$ (C) $3 + 5x$ (D) $5x \ln 3$ (E) $15x$

34. Solve for x: $\log_6(x + 3) + \log_6(x + 4) = 1$

- (A) -6, -1 (B) -6 (C) -1 (D) 6, 1 (E) No solution

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1. $(f \circ g)(x) = 6 - 2x$ 2. 4 3. $(g \circ f)(x) = x - 1$ 4. $\{(-3, 2), (5, 1), (2, 0)\}$
5.a. $f^{-1}(x) = \sqrt[3]{1 - x}$ 5.b. $f^{-1}(x) = \frac{2}{x} - 3$ 6. 1253 7. $f(x) = 3^{x+2} - 5$
8. 3.4384 9. 23.6 wpm 10. (1.48, 5.8) 11. $(-4, \infty)$ 12. 2.4650
13. $x - 3$ 14. 69% 15. $3^x = 2$ 16. $e^t = y$ 17. $\log_B p = w$
18. $\ln m = t$ 19. $\log \frac{4}{3}$ 20. $2 \ln x + .5 \ln w - 3 \ln y$ 21. 1.9747
22. 1.2263 23. -10.1407 24. 9 25. 4 26. 1.01
27. 21.5 years 28. 12.84 years 29. C 30. E 31. C
32. B 33. C 34. C