

**Indiana University East
Math-M123
Practice Final Exam**

Note: The actual final exam will be considerably shorter than this.

1-3. Graph each equation.

1. $y = \frac{3}{4}x - 2$

2. $3x + 5y = -15$

3. $4x - 3y = 24$

4-6. Find the intercepts. Then graph.

4. $2y + 5x = -10$

5. $5 - 6y = 10x$

6. $-9x - 6y = 54$

7-9. Find the slope of the line containing the given points. If the slope is undefined, state this.

7. $(-4, 7)$ and $(2, 5)$

8. $(5, -1)$ and $(10, -1)$

9. $(-9, -7)$ and $(-1, -3)$

10-11. Find the slope and the y-intercept of the line given by:

10. $8x + 3y = 12$

11. $y + 7x = -10$

12-13. Write the equation of the line with the given slope and y-intercept in (a) point-slope form and (b) slope-intercept form.

12. slope = $-\frac{2}{3}$, y-intercept = $(0, -2)$

13. slope = 4, y-intercept = $(0, 3)$

14-15. Solve. If no solution exists, state this.

14. $\frac{3}{x-4} = \frac{5}{x+1}$

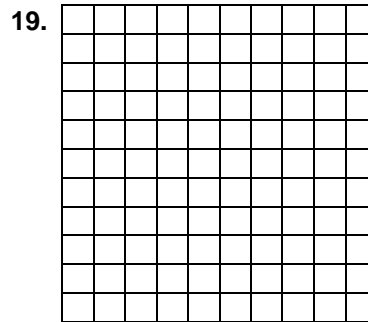
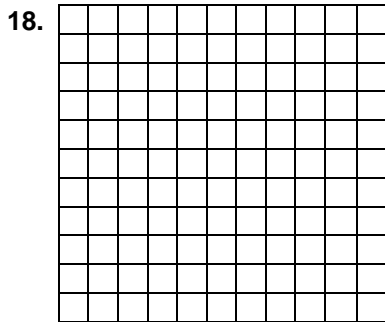
15. $\frac{2x-1}{9} = \frac{3x+7}{5}$

16-17. Find the function values.

16. $f(x) = \frac{2x}{x-4}$ find (a) $f(1)$ and (b) $f(-2)$

17. $g(x) = 3x^2 + 4x - 1$ find (a) $g(2t)$ (b) $g(4)$

18-19. For each of the following graphs of functions, determine the domain and the range of the function. (See pages 461-462 in text, exercises #11-30.)



20. In 1980, the economic loss from motor vehicle accidents was \$57.1 billion, as reported by the National Safety Council. By 1985, the economic loss from these accidents had increased to \$76.0 billion. Let L represent the economic loss, in dollars, t years after 1980.

a. Find a linear function, $L(t)$, that fits the data.

b. Use the function of part (a) to predict the economic loss from motor vehicle accidents in 2010.

21-22. Perform the correct operation using algebra of functions.

21. Let $a(x) = 2x^2 - 3x - 4$. Let $b(x) = -6x + 5$.

a. Find $(a + b)(x)$

b. Find $(a - b)(x)$

22. Let $f(x) = -3x - 2$. Let $g(x) = 9x - 4$.

a. Find $(f \cdot g)(x)$

b. Find $(f / g)(x)$

23-24. Solve the variation problems.

23. The weight of a load of bricks varies directly with the number of bricks in the load. If a load of 500 bricks weighs 1175 pounds, what will a load of 1200 bricks weigh?

24. The current I in an electrical conductor varies inversely as the resistance R of the conductor. If the current is 0.5 amperes when the resistance is 240 ohms, what is the current when the resistance is 540 ohms?

25-26. Solve each formula for the specified variable.

25. $\frac{1}{a} + \frac{1}{b} = 6$; solve for a

26. $\frac{E}{e} = \frac{R+r}{R}$; solve for R

27-28. Find a system of linear equations to solve each problem. Solve the system by using substitution or elimination.

27. If 5 root beers and 7 orders of French fries cost \$16.75 and 4 root beers and 5 orders of French fries cost \$12.50, then what are the prices of one root beer and one order of French fries?

28. A farmer received 90 cents per bushel more for his wheat than he did for his corn. If he sold 6000 bushels of wheat and 4000 bushels of corn for a total of \$30,400, what was the price per bushel of each?

29-30. Solve the system of equations by using the substitution or the elimination method.

29.
$$\begin{aligned} 2x - y &= 1 \\ x + 5y &= 50 \end{aligned}$$

30.
$$\begin{aligned} 6x - 4y &= 19 \\ -4x + y &= -6 \end{aligned}$$

31. Solve the system of linear equations by using the Gauss-Jordan elimination method.

$$\begin{aligned} x + 4y + 3z &= 2 \\ 2x + y + z &= 10 \\ -x + y + 2z &= 8 \end{aligned}$$

32-33. Solve the inequality and graph the solution set on a number line.

32. $3(x - 1) - 4(2x + 3) > 0$

33. $5 - 5(5 - x) \leq 5(x - 1) + 2x$

34-35. Solve the compound inequality and write the solution set in interval notation.

34. $5x - 7 \geq 8$ and $2 - 3x < -4$

35. $5 - 2x < -9$ or $6x - 2 > 5x$

36-38. Simplify each expression. Include absolute value bars when necessary.

36. $\sqrt{y^2 + 6y + 9}$

37. $\sqrt{9t^2 + 12t + 4}$

38. $\sqrt[4]{16(x+3)^8}$

39-40. Multiply and Simplify.

39. $2\sqrt{5} \cdot 3\sqrt{5}$

40. $\sqrt[4]{27x^2y^5} \cdot \sqrt[4]{3x^3y^3}$

41-42. Simplify using the quotient rule for radicals.

41. $\sqrt{\frac{4x^4}{9y^{10}}}$

42. $\sqrt[3]{\frac{a^{12}}{27b^9}}$

43-44. Divide and, if possible, simplify.

43. $\frac{\sqrt{x^3y^5}}{\sqrt{x^5y}}$

44. $\frac{\sqrt[3]{108a^5b^7c^9}}{\sqrt[3]{2abc}}$

45-46. Rationalize the denominator.

45. $\sqrt{\frac{8}{y}}$

46. $\sqrt[3]{\frac{12}{a^2}}$

47-48. Solve the radical equation.

47. $\sqrt{4x+13} = 2x - 1$

48. $x = 4 + \sqrt{32 - 2x}$

49-50. In a right triangle, find the length of the side not given. Give an exact answer and, where appropriate, an approximation to three decimal places. Note: a and b represent the lengths of legs and c is the length of the hypotenuse of a right triangle.

49. $a = 9, b = 6.$

50. $a = 4, c = 7$

51-52. Perform the indicated operation and simplify. Write each answer in the form $a + bi$.

51. $(7 - 2i)(8 + 5i)$

52. $\frac{9}{4 + 5i}$

53-54. Solve the quadratic equation by completing the square. You must show your work.

53. $x^2 - 6x - 4 = 0$

54. $x^2 = 4x + 8$

55-56. Solve the quadratic equation using the quadratic formula. Simplify solutions, if possible.

55. $5 - 13x - 6x^2 = 0$

56. $5 = 2x(1 - 3x)$

57-58. Compute the discriminant. Then determine the number and type of solutions for the given equation.

57. $4x^2 + 12x = 7$

58. $3x^2 + 4x - 8 = 0$

59-60. For each of the following, graph the function and find the vertex, the axis of symmetry, and the maximum or the minimum value.

59. $f(x) = (x - 3)^2 - 4$

60. $g(x) = -2(x + 1)^2 + 5$

61-62. For each pair of functions, find (a) $(f \circ g)(x)$ and (b) $(f \circ g)(5)$.

61. $f(x) = 3x - 5; g(x) = x^2 + 1$

62. $f(x) = 2x^2 - 1; g(x) = 6x + 7$

63-64. For each function, find a formula for its inverse.

63. $f(x) = 2x - 9$

64. $h(x) = \frac{1}{4}x + 3$

65-66. Graph the exponential equation.

65. $y = 3^x - 1$

66. $y = 2^{x-4} - 3$

67. A laser printer is purchased for \$1400. Its value each year is about 76% of the value of the preceding year. Its value, in dollars, after t years is given by the exponential function

$$V(t) = 1400(0.76)^t$$

Find the value of the printer after

(a) 2 years

(b) 5 years

68-69. Rewrite each of the following as an equivalent exponential expression. Do not solve.

68. $\log_3 243 = x$

69. $\log_e 0.25 = -1.3863$

70-71. Rewrite each of these as an equivalent logarithmic equation. Do not solve.

70. $4^x = 512$

71. $e^{1.56} = m$

72-73. Express as an equivalent expression, using the individual logarithms of w , x , y , & z .

72. $\log_a \frac{w^3 x^2}{y^4 z}$

73. $\log_b (wx^3 y^2)$

74-75. Find each of the following logarithms using the change-of-base formula. Round answers to four decimal places.

74. $\log_2 19$

75. $\log_\pi 2.6$

76-77. Solve. Where appropriate, include approximations to three decimal places.

76. $2^{2x+3} = 128$

77. $3^{x+9} + 5 = 248$

78. In 2008, the world population was 6.7 billion and the exponential growth rate was 1.14% per year. The world population exponential growth model is $P(t) = 6.7e^{0.0114t}$ where the population P is in billions and the time t is in years since 2008.

Predict the world population in these years:

(a) 2015

(b) 2030