1. Evaluate the following expressions.

(a) $6(7 - 2^2) + (-1)^5 + 3^0 + (1 - 2)^2$

(b) $\dfrac{10}{3} - \dfrac{1 - 3}{4 + 2} \div (5 - 1^2)$

(c) $\dfrac{-3^2 - 4}{5 - 6} \div \left| \dfrac{7 - (-4)^2}{3} \right| + \dfrac{5}{3}$

2. Expand and simplify the following algebraic expressions.

(a) $(3x - 2)^2 + (x^2 + 4)(3 - x)$

(b) $(2s + t)(2s - t) + [t + 2(s + 1)]t - 2ts$

3. An electronic store uses a markup rate of 60% on all items. The cost of a CD player is \$45. What is the selling price of the CD player? Recall: Selling Price = Cost + Cost · Markup Rate

4. You invested \$1000 in corporate bonds that earned \$475 in interest after 5 years. What was the simple interest rate? Recall: $I = Prt$

5. Solve each equation for x.

(a) $2(x + 3) - 5(2 - x) = 3(x + 4) + 2(2x + 1)$

(b) $3\left(\dfrac{x}{2} - \dfrac{1}{6} \right) = \dfrac{1}{9} - \dfrac{x}{3}$

(c) $x + x^2 = (x + 2)(x - 1) + 2$

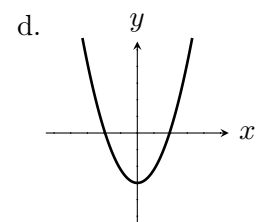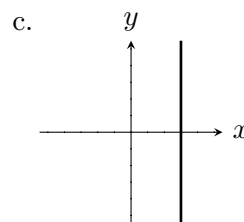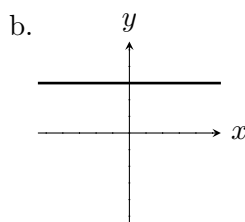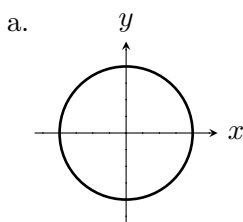6. Consider the line that passes through the points $(-4, -1)$ and $(2, 6)$.

(a) Find the slope of the line.

(b) Find an equation for the line.

(c) Find the x-intercept of the line.

7. Let $f(x) = 2x^3 - 5x + 3$.　　(a) Evaluate $f(3)$.　　(b) Evaluate $f(-\frac{1}{2})$.

8. Which of the following graphs represent a function of x?

a.

b.

c.

d.

9. Consider the line that passes through the point $(15, -3)$ and is perpendicular to the line $5x - 3y = 0$.

(a) Find an equation for the line.　　(b) Sketch the line.

10. Simplify each of the following expressions and express the result without using negative exponents. Assume that each variable is not zero.

(a) $\left(\dfrac{12a^{-2}b^4}{20a^{-1}b}\right)^{-1}$ (b) $\left(-3x^{-3}y^3\right)^2\left(2x^{-1}y^3\right)^{-2}$

11. Factor each polynomial completely.

(a) $27x^3 - 1$

(b) $6x^2 - 5x - 4$

12. Solve the equation $x = \sqrt{3x + 16} - 2$ for x, or show that the equation has no solutions.

13. Solve the following equations for x by factoring.

(a) $7x^2 - 36x = x^2$

(b) $x(x + 1) = 12$

(c) $x^3 - 4x^2 - x + 4 = 0$

14. *By taking square roots*, find the solution(s) to $7(3x - 2)^2 - 28 = 0$.

15. *By completing the square*, find the solution(s) to $x^2 - 14x - 1 = 0$.

16. *Using the Quadratic Formula*, find the solution(s) to $2x^2 = 4x + 3$.

17. (3 points) Solve the system by the method of substitution.

$$\begin{cases} 5x + 2y = -11 \\ 2x + \ y = -4 \end{cases}$$

18. Solve the system by the method of elimination.

$$\begin{cases} 3x + 10y = 2 \\ 2x + \ 7y = 1 \end{cases}$$

19. Simplify each of the following expressions. Assume that $x, y > 0$.

(a) $-2\sqrt{27} + 5\sqrt{48} + 4\sqrt{3}$

(b) $(2\sqrt{5} - \sqrt{3})(\sqrt{5} + 4\sqrt{3})$

(c) $\sqrt{80x^4y^7}$

(d) $\sqrt{\dfrac{36x^{-3}y}{3x^{-5}y^{-7}}}$

20. Rationalize the denominator of each expression and simplify the result. Assume that $x > 0$.

(a) $\dfrac{2\sqrt{3}}{\sqrt{5} - 1}$

(b) $\dfrac{10x}{\sqrt{2x^3}}$

21. Evaluate each logarithm.

(a) $\log_4 \frac{1}{16}$
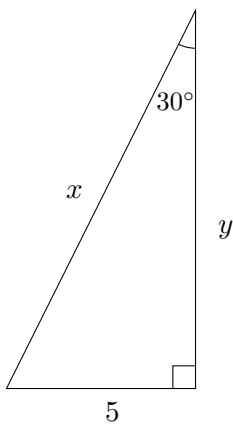
(b) $\ln e^3$

22. Solve each equation for x.

(a) $4e^{3x} - 5 = 27$

(b) $5^{2x-3} = \dfrac{1}{25}$

23. Given $\sec\theta = \sqrt{2}$, find the acute angle θ.

24. Let θ be an acute angle in a right triangle such that $\cos\theta = \frac{\sqrt{5}}{3}$. Find the exact values of the other five trigonometric functions.

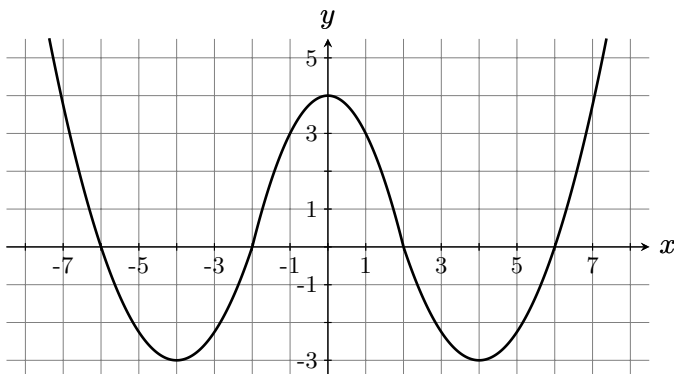25. Find the exact value of x and y in the triangle below.

26. Given the points $A(4,3)$ and $B(2,6)$.

(a) Determine the midpoint between A and B.

(b) Determine the distance between A and B.

27. Give the domain, range, intercepts, sign (where f is positive/negative) and extrema (local max/min) of the function f whose graph is displayed below.

Answers

1. (a) 19   (b) $\dfrac{41}{12}$ (c) 6   **2.** (a) $-x^3 + 12x^2 - 16x + 16$ (b) $4s^2 + 2t$

3. $72   **4.** 9.5%   **5.** (a) No solution   (b) $\dfrac{1}{3}$ (c) All real numbers

6. (a) $m = \dfrac{7}{6}$ (b) $y = \dfrac{7}{6}x + \dfrac{11}{3}$ (c) $(\frac{-22}{7}, 0)$ **7.** (a) 42   (b) $\dfrac{21}{4}$

8. b. and d.   **9.** (a) $y = \dfrac{-3}{5}x + 6$ **10.** (a) $\dfrac{5a}{3b^3}$ (b) $\dfrac{9}{4x^4}$

11. (a) $(3x - 1)(9x^2 + 3x + 1)$ (b) $(2x + 1)(3x - 4)$ **12.** $x = 3$

13. (a) $x = 0, x = 6$ (b) $x = -4, x = 3$ (c) $x = -1, x = 1, x = 4$ **14.** $x = 0, x = \dfrac{4}{3}$

15. $x = 7 \pm 5\sqrt{2}$ **16.** $x = 1 \pm \dfrac{\sqrt{10}}{2}$ **17.** $(-3, 2)$ **18.** $(4, -1)$

19. (a) $18\sqrt{3}$ (b) $-2 + 7\sqrt{15}$ (c) $4x^2y^3\sqrt{5y}$ (d) $2\sqrt{3}xy^4$

20. (a) $\dfrac{\sqrt{3}(\sqrt{5} + 1)}{2}$ (b) $\dfrac{5\sqrt{2x}}{x}$ **21.** (a) -2 (b) 3

22. (a) $x = \dfrac{\ln 8}{3} = \ln 2$ (b) $x = \dfrac{1}{2}$ **23.** $45°$

24. $\sin\theta = \frac{2}{3}$, $\tan\theta = \frac{2\sqrt{5}}{5}$, $\csc\theta = \frac{3}{2}$, $\sec\theta = \frac{3\sqrt{5}}{5}$, $\cot\theta = \frac{\sqrt{5}}{2}$

25. $x = 10$, $y = 5\sqrt{3}$ **26.** (a) $(3, 4.5)$ (b) $\sqrt{13}$ units

27. Domain: $\mathbb{R}$, Range: $[-3, \infty)$, x-intercepts: $(-6, 0), (-2, 0), (2, 0), (6, 0)$, y-intercept: $(0, 4)$,
Positive: $(-\infty, -6) \cup (-2, 2) \cup (6, \infty)$, Negative: $(-6, -2) \cup (2, 6)$, Local max: $(0, 4)$,
Local min: $(-4, -3), (4, -3)$