

1. (6 points) Evaluate the following expressions.
- (a) $-3(7 - 9)^3 - (3 - 5)^2(2 + 3^1) + 5^0$
- (b) $\frac{(22 - 32)^2}{|-3 \cdot 2 \cdot 10 + 2 \cdot 5|} + \left| \frac{11 - 8 \cdot 11}{11} \right| - \frac{7^0(4 - 6)}{2}$
- (c) $\frac{3 - 5^{(3-2)}}{2 \cdot 2^2} \div \frac{5 - (-2)^3}{5^2 + 3^2}$
2. (4 points) Expand and simplify the following expressions.
- (a) $-(3x - (4 + 5x))^2 + \frac{3}{4}(8 - 12x)$
- (b) $5(2x(x + 1) - (3 - x)) - 2(3x - 1)(3x + 1)$
3. (2 points) A coffee grinder is sold at a store where small appliances are marked up by 15%. If the selling price is \$23, what was the original price of the coffee grinder? [Recall: Selling Price = Original Price + Original Price · Markup Rate]
4. (2 points) What was the principal amount deposited to my account if it earned \$1200 in 6 years in simple interest at an annual interest rate of 4%? [Recall: $I = P \cdot r \cdot t$]
5. (6 points) Solve for x in the following equations.
- (a) $2(6x + 1) = 8(x + 1) - 2(1 - 2x)$
- (b) $\frac{x}{3} - \frac{x + 2}{8} + \frac{x + 3}{6} = \frac{2 - x}{4}$
- (c) $(x + 5)^2 = (x - 3)(x + 3) + 8x$
6. (4 points) Consider the the points $A(-3, 4)$ and $B(-5, -2)$.
- (a) Find the equation of the line that passes through the points A and B .
- (b) Find the midpoint between the points A and B .
- (c) Find the distance between the points A and B .
- (d) Find the horizontal line that passes through the point B .
7. (4 points) Consider the line that passes through the point $(-2, 3)$ and perpendicular to $2x - y + 7 = 0$.
- (a) Find the equation of the line.
- (b) Sketch both lines in the same coordinate system.
8. (3 points) Solve the following linear system by the method of substitution.
- $$\begin{cases} -4x + 9y = 9 \\ x - 3y = -6 \end{cases}$$
9. (3 points) Solve the following linear system by the method of elimination.
- $$\begin{cases} 3x - 2y = 2 \\ 5x - 5y = 10 \end{cases}$$
10. (4 points) Simplify each of the following expressions. You may assume that all variables are positive. Present the result without negative exponents.
- (a) $-(3x^3y^{-2}z^4)^3(2xy^3z^0)^{-2} =$
- (b) $\left(\frac{-3x^{-4}y^2z^3}{21x^3z^2}\right)^{-2} =$
11. (4 points) Factor each polynomial completely.
- (a) $7x^2 - 5x - 2$
- (b) $3x^4 + 9x^3 + 6x^2$
12. (3 points) Solve the equation $\sqrt{2x - 7} = x - 3$ or show that it has no solutions.
13. (6 points) Solve the following equations for x by factoring.
- (a) $3x^2 + 8 = 10x$
- (b) $x^3 - 9x + 18 = 2x^2$
14. (3 points) By taking square roots, find all solutions to $36\left(\frac{3x - 2}{2}\right)^2 - 9 = 0$.
15. (3 points) By completing the square, find all solutions to $x^2 - 8x + 21 = 6$.

16. (3 points) By using the Quadratic Formula, find all solutions to $5x^2 + 9x = -4$.

17. (8 points) Simplify each of the following expressions. You may assume that all variables are positive. Present the result without negative exponents.

(a) $4\sqrt{18} + 6\sqrt{12} - 6\sqrt{27}$

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

(c) $\sqrt{3200x^{13}y^9z^{11}}$

(d) $\sqrt{\frac{50x^3y^{-4}}{180x^{-4}y^{-8}}}$

18. (4 points) Rationalize the denominator of each expression and simplify.

(a) $\frac{3}{\sqrt{5} - \sqrt{3}}$

(b) $\frac{5\sqrt{2}}{3\sqrt{7}}$

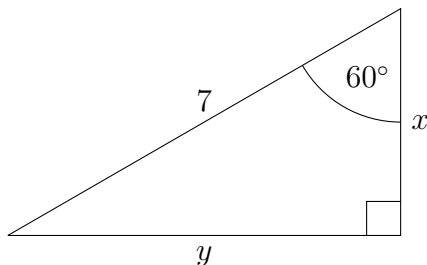
19. (4 points) Evaluate the following expression:
 $\log_4(64) - \ln(e^2) + \log_3\left(\frac{1}{27}\right)$

20. (4 points) Solve each equation for x .

(a) $3^{2x-1} + 6 = 3^2$

(b) $\frac{3}{2^{x-5}} = 12$

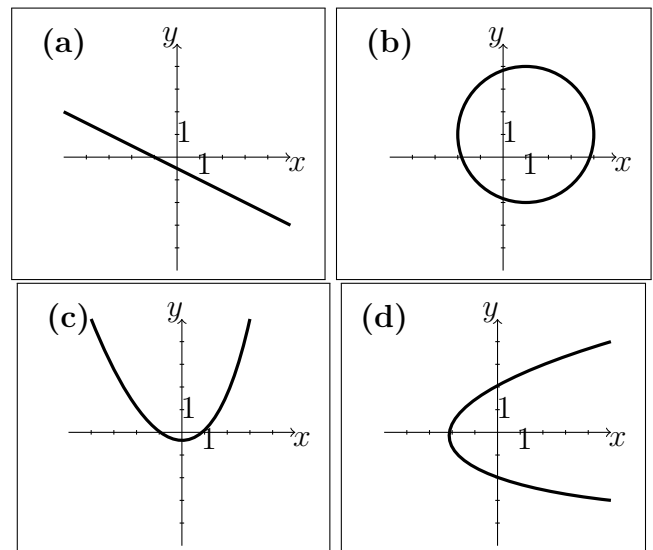
21. (2 points) Find the exact values of x and y in the right triangle below.



22. (3 points) If $\csc \theta = \frac{\sqrt{7}}{2}$ for the acute angle θ in a right triangle, find the exact values of the other five trigonometric functions.

23. (2 points) Find the exact value of the following expression: $\sec 45^\circ - \sin 60^\circ$.

24. (2 points) Which of the following are graphs of relations for which y is function of x ?



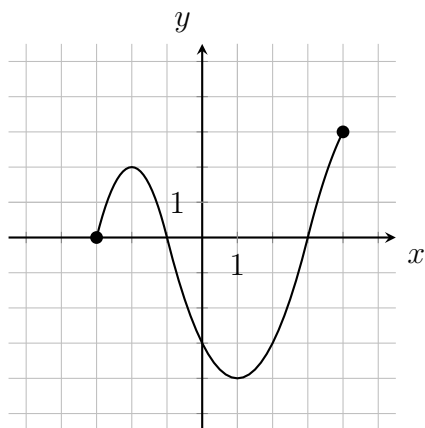
25. (5 points) Given $f(x) = x^2 - 3x + 1$ and $g(x) = \frac{3}{2}x + \frac{1}{2}$, evaluate and simplify the following expressions.

(a) $\frac{g(1)}{f(5)} =$

(b) $f(\sqrt{2}) - g(-1) =$

(c) $f(x+h) =$

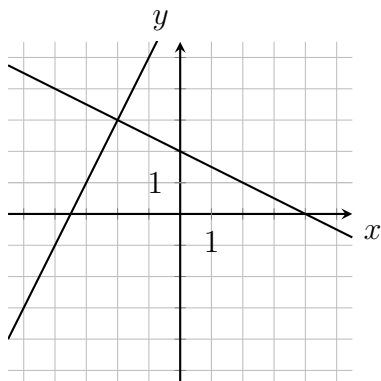
26. (6 points) Given the graph $y = f(x)$ of a function $f(x)$, find



- (a) the domain of $f(x)$:
- (b) the range of $f(x)$:
- (c) the x -intercepts:
- (d) the y -intercept:
- (e) the local minima of $f(x)$:
- (f) the local maxima of $f(x)$:

Answers.

- 1. (a) 5 (b) 10 (c) $-\frac{17}{26}$
- 2. (a) $-4x^2 - 25x - 10$ (b) $-8x^2 + 15x - 13$
- 3. \$20
- 4. \$5000
- 5. (a) No solution (b) $x = \frac{2}{5}$ (c) $x = -17$
- 6. (a) $y = 3x + 13$ (b) $(-4, 1)$
(c) $2\sqrt{10}$ (d) $y = -2$
- 7. (a) $y = -\frac{1}{2}x + 2$
(b)



- 8. $x = 9, y = 5$
- 9. $x = -2, y = -4$
- 10. (a) $-\frac{27x^7z^{12}}{4y^{12}}$ (b) $\frac{49x^{14}}{y^4z^2}$
- 11. (a) $(7x + 2)(x - 1)$ (b) $3x^2(x + 1)(x + 2)$
- 12. $x = 4$ (checks)
- 13. (a) $x = 2, x = \frac{4}{3}$ (b) $x = -3, x = 3, x = 2$
- 14. $x = \frac{1}{3}, x = 1$
- 15. $x = 3, x = 5$
- 16. $x = -1, x = -\frac{4}{5}$
- 17. (a) $12\sqrt{2} - 6\sqrt{3}$ (b) $-54 - 5\sqrt{10}$
(c) $40x^6y^4z^5\sqrt{2xyz}$ (d) $\frac{x^3y^2\sqrt{10x}}{6}$
- 18. (a) $\frac{3\sqrt{5} + 3\sqrt{3}}{2}$ (b) $\frac{5\sqrt{14}}{21}$
- 19. $3 - 2 + (-3) = -2$
- 20. (a) $x = 1$ (b) $x = 3$
- 21. $x = \frac{7}{2}, y = \frac{7\sqrt{3}}{2}$
- 22. $\sin \theta = \frac{2\sqrt{7}}{7}, \cos \theta = \frac{\sqrt{21}}{7}, \tan \theta = \frac{2\sqrt{3}}{3}$
 $\csc \theta = \frac{\sqrt{7}}{2}, \sec \theta = \frac{\sqrt{21}}{3}, \cot \theta = \frac{\sqrt{3}}{2}$
- 23. $\sqrt{2} - \frac{\sqrt{3}}{2} = \frac{2\sqrt{2} - \sqrt{3}}{2}$
- 24. (a) and (c)
- 25. (a) $\frac{2}{11}$ (b) $4 - 3\sqrt{2}$ (c) $x^2 + 2xh + h^2 - 3x - 3h + 1$
- 26. (a) $[-3, 4]$ (b) $[-4, 3]$ (c) $(-3, 0), (-1, 0), (3, 0)$
(d) $(0, -3)$ (e) $(1, -4)$ (f) $(-2, 2)$