

1. (6 points) Evaluate the following expressions:

(a) $26 - [|5 - 20^0 - 6| + (4 - 5)^3(-6 + 10^1)]$

(b) $\left(\frac{2}{5} - \frac{1}{3}\right) + \left(\frac{2}{3} \div \frac{5}{4}\right)$

(c) $\frac{5^2 - 5^{(5-4)}}{2 \cdot 2^3} \div \frac{6 \cdot (-2)^2}{5 + |4 - 7|}$

2. (2 points) A phone originally sells for \$300, but is put on sale for only \$195. What is the discount rate? [Recall: Sale Price = Original Price – Original Price · Discount Rate]

3. (2 points) Suppose Jan borrows \$1500 at a simple annual interest rate. After two years Jan pays off the loan with a payment of \$2040. What was the annual interest rate charged? [Recall: $I = Prt$]

4. (4 points) Expand and simplify the following expressions.

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

(b) $2(3 - x)^2 - (x + 2)(x - 2)$

5. (4 points) Simplify each of the following expressions and present the result without negative exponents. You may assume that all variables are positive.

(a) $(4x^2y^{-3}z^0)^3(4xy^2z^{-1})^{-5}$

(b) $\left(\frac{-16x^{-3}y^3z}{4xy^3z^{-4}}\right)^{-2}$

6. (6 points) Solve the following equations for x :

(a) $4(3x - 1) - 2(x + 1) = 2 + 2(x - 1) - 6(2x - 1)$

(b) $x + \frac{25 - x}{9} = \frac{x}{3} - \frac{5}{3}$

(c) $(2x + 1)^2 = (2x - 3)(2x + 3)$

7. (8 points) Simplify each of the following expressions. You may assume that all variables are positive.

(a) $4\sqrt{45} - 2\sqrt{500} - 3\sqrt{125}$

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

(c) $5x^3z^2\sqrt{9x^7y^{16}z^{-6}}$

(d) $\sqrt{\frac{4x^2y}{81x^{-3}y^5}}$

8. (5 points) Consider the points $A(-3, 11)$, $B(1, 5)$, and $C(6, 0)$.
- Find the equation of the line that passes through B and C ;
 - Find the equation of the line passing through A and parallel to the line $x = 5$;
 - Find the midpoint between the points A and C ;
 - Find the distance between the points A and B .
9. (4 points) Consider the line that passes through the point $(2, -1)$ and is parallel to $2x + 4y = -8$.
- Find the equation of the line.
 - Sketch **both** lines in the same coordinate system.

10. (3 points) Solve the following linear system by **the method of elimination**.

$$4x - y = 2$$

$$2x + y = 4$$

11. (3 points) Solve the following linear system by **the method of substitution**.

$$5x + y = 16$$

$$-x + 2y = -1$$

12. (4 points) Factor each polynomial completely:

(a) $2x^2 - x - 15$

(b) $x^2(x^2 - 25) - 9(x^2 - 25)$

13. (3 points) Solve the equation $\sqrt{7 + 3x} = x + 3$ or show that it has no solutions.

14. (6 points) Solve the following equations **by factoring**:

(a) $x^3 + 36x = 4x^3 + 3x^2$

(b) $(3x + 2)(x + 1) = 10$

15. (3 points) By **taking square roots**, find all solutions to $25(x - \frac{1}{2})^2 - 16 = 0$.

16. (3 points) By **completing the square**, find all solutions to $x^2 - 6x + 5 = 12$.

17. (3 points) By using **the Quadratic Formula**, find all solutions to $2x^2 + 1 = 4x$.

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

(a) $\frac{10}{\sqrt{5} - \sqrt{2}}$

(b) $\frac{\sqrt{15} + \sqrt{20}}{\sqrt{5}}$

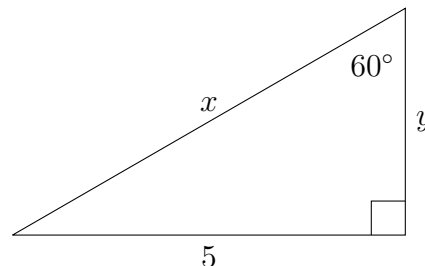
19. (4 points) Evaluate the following expression: $\log_7 49 + \log_2 \frac{1}{16} - \ln(e^{-21})$

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

(a) $25^{5-3x} + 3^3 = 28$

(b) $9^{3x+6} = 27^{x-2}$

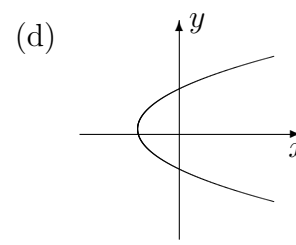
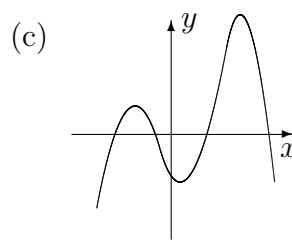
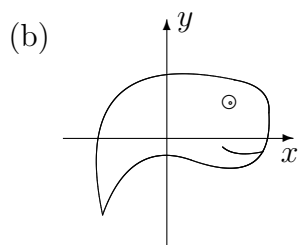
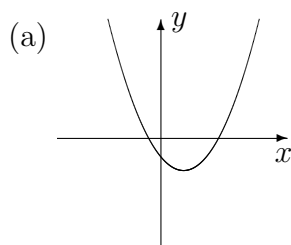
21. (2 points) Find the exact values of x and y in this triangle:



22. (3 points) If $\sec \theta = 7$ for an acute angle in a triangle, find the exact values of the other five trigonometric functions.

23. (2 points) Find the exact value of the following expression: $\cos 30^\circ - \sin 45^\circ$

24. (2 points) Which of the following curves are graphs of relations for which y is a function of x (and which are not):



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

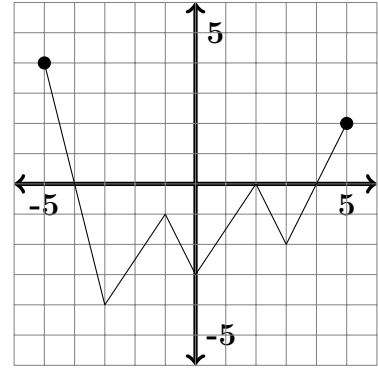
(a) $f(1) - g(6) =$

(b) $\frac{f(1)}{g(6)} =$

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

26. (5 points) For the function (whose graph is given), find:

- (a) the domain,
- (b) the range,
- (c) the x and y intercepts,
- (d) the intervals where the function is positive,
- (e) the intervals where the function is negative,
- (f) the local extrema.



Answers

1. (a) 28
(b) $\frac{3}{5}$
(c) $\frac{5}{12}$
2. 35%
3. 18%
4. (a) $2x^2 + 3x + 37$
(b) $x^2 - 12x + 22$
5. (a) $\frac{xz^5}{16y^{19}}$
(b) $\frac{x^8}{16z^{10}}$
6. (a) $x = \frac{3}{5}$
(b) $x = -8$
(c) $x = -\frac{5}{2}$
7. (a) $-23\sqrt{5}$
(b) $41 - 11\sqrt{21}$
(c) $\frac{15x^{13/2}y^8}{z}$
(d) $\frac{2x^{5/2}}{9y^2}$
8. (a) $y = -x + 6$
(b) $x = -3$
(c) $(\frac{3}{2}, \frac{11}{2})$
(d) $2\sqrt{13}$
9. (a) $y = \frac{-1}{2}x$
(b)
10. $x = 1, y = 2$
11. $x = 3, y = 1$
12. (a) $(2x + 5)(x - 3)$
(b) $(x + 3)(x - 3)(x + 5)(x - 5)$
13. $x = -2, -1$
14. (a) $x = -4, 0, 3$
(b) $x = -\frac{8}{3}, 1$
15. $x = -\frac{3}{10}, \frac{13}{10}$
16. $x = -1, 7$
17. $x = \frac{2 \pm \sqrt{2}}{2} = 1 \pm \frac{1}{2}\sqrt{2}$
18. (a) $\frac{10(\sqrt{5} + \sqrt{2})}{3}$
(b) $\sqrt{3} + 2$
19. 19
20. (a) $x = \frac{5}{3}$
(b) $x = -6$
21. $x = \frac{10}{\sqrt{3}}, y = \frac{5}{\sqrt{3}}$
22. $\sin \theta = \frac{4\sqrt{3}}{7}, \cos \theta = \frac{1}{7}, \tan \theta = 4\sqrt{3},$
 $\csc \theta = \frac{7\sqrt{3}}{12}, \sec \theta = 7, \cot \theta = \frac{\sqrt{3}}{12}$
23. $\frac{\sqrt{3} - \sqrt{2}}{2}$
24. (a) Yes (b) No (c) Yes (d) No
25. (a) -4
(b) $\frac{1}{5}$
(c) $2xh + h^2 - h$
26. (a) $[-5, 5]$
(b) $[-4, 4]$
(c) $(-4, 0), (2, 0), (4, 0), (0, -3)$
(d) $[-5, -4) \cup (4, 5]$
(e) $(-4, 2) \cup (2, 4)$
(f) local minimums: $(-3, -4), (0, -3)$ and $(3, -2)$; local maximums: $(-1, -1)$ and $(2, 0),$

