

1. (6 points) Evaluate the following expressions:
 - (a) $(5 - 6)^7 - 3(4 - 2^2) + 40^0$;
 - (b) $(6 - 8)^3 \div \frac{1 - (-3)}{1 + 2(1^2 - 2)} - \frac{1}{2}$;
 - (c) $\frac{1 - 3^2}{3^2 - 2^3} \div \left| \frac{6 - (-2)^2}{4 - 5} \right| + 2$.

2. (4 points) Expand and simplify the following expressions.
 - (a) $(3x - 2)(9x^2 + 6x + 4) - (3x)^3$;
 - (b) $(4x - 5y)(4x + 5y) - 16(x - 2)^2$;

3. (2 points) A stove is sold at a 20% discount for \$ 640. What was the original price of the stove?
[Recall: Selling Price = Original Price - Original Price · Discount Price]

4. (2 points) How much (simple) interest is accumulated if \$20 is invested at 2% for 8 years? [Recall: $I = PRT$]

5. (2 points) A microwave appliance is sold for \$ 26 at a store that marks up small kitchen appliances by 30%. What was the original price of the microwave? [Recall: Selling Price = Cost + Cost · Markup Rate]

6. (6 points) Solve for x in the following equations:
 - (a) $\frac{x - 4}{3} - \frac{x + 2}{3} = \frac{x - 27}{4}$
 - (b) $2(x + 1) - 4(2 - x) = 1 + 3(x + 4) + 4(2 - 3x)$
 - (c) $x(x - 2) - (x + 1)^2 = 3$

7. (3 points) Consider the line that passes through the points $(5, -3)$ and $(2, -1)$.
 - (a) Find the slope of the line;
 - (b) Find the equation of the line;
 - (c) Find the x - intercept of the line.

8. (4 points) Consider the line that passes through the point $(3, 1)$ and is perpendicular to $3x + y = 5$.
 - (a) Find the equation of the line.
 - (b) Sketch **both** lines in the same coordinate system.

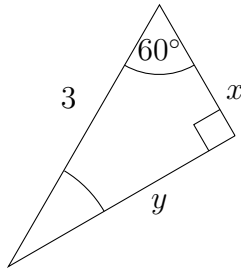
9. (3 points) Solve the following linear system by **the method of substitution**.

$$\begin{aligned} 2x - y &= 1 \\ -x + 2y &= 7 \end{aligned}$$

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

$$\begin{aligned} 3x - 4y &= 18 \\ 2x + 5y &= -11 \end{aligned}$$

11. (4 points) Simplify each of the following expressions and present the result without negative exponents. You may assume that all variables are positive.
 - (a) $(2xy^{-3}z^2)^2(4y^2z^{-1})^{-2}$;
 - (b) $\left(\frac{10x^3y^2z^3}{25x^{-1}y^0z^3} \right)^{-2}$.

12. (4 points) Factor each polynomial completely:
(a) $4x^2 - x - 3$, (b) $x^2 + 27x^5$.
13. (3 points) Solve the equation $\sqrt{2x - 1} = x + 1$ or show that it has no solutions.
14. (6 points) Solve the following equations by factoring:
(a) $(3x - 1)(x + 1) = 4$;
(b) $x^4 + 8 = x^3 + 8x$
(c) $x^3 - 7x^2 = 4x - 28$
15. (3 points) By **taking square roots**, find all solutions to $4(3x - 1)^2 - 7 = 0$.
16. (3 points) By **completing the square**, find all solutions to $x^2 + 6x + 3 = 0$.
17. (3 points) By using **the Quadratic Formula**, find all solutions to $2x^2 + 5 = 3x$.
18. (8 points) Simplify each of the following expressions. You may assume that all variables are positive.
(a) $\sqrt{75} - \sqrt{12} + 2\sqrt{27}$;
(b) $(2\sqrt{2} - \sqrt{27})(2\sqrt{3} + \sqrt{8})$;
(c) $\sqrt{50x^5y^7z^3}$;
(d) $\sqrt{\frac{18x^4y^2}{50x^{-3}y^{-4}}}$.
19. (4 points) Rationalize the denominator of each expression and simplify:
(a) $\frac{3\sqrt{18}}{5 - 2\sqrt{2}}$;
(b) $\frac{3}{x - \sqrt{x^2 + 20}}$.
20. (3 points) Evaluate the following logarithms:
(a) $\log_3 81$;
(b) $\ln(e^{-3})$;
(c) $\log_3 \frac{1}{27}$.
21. (4 points) Solve each equation for x :
(a) $3^{2x-1} + 54 = 81$;
(b) $\frac{1}{2^{x-4}} = 32$
22. (2 points) Find the exact values of x and y in the triangle below:
- 
23. (3 points) If $\csc \theta = \frac{5}{\sqrt{3}}$ for an acute angle in a triangle, find the exact values of the other five trigonometric functions.
24. (2 points) Find the midpoint between the points $(-2, 3)$ and $(6, -2)$.

25. (2 points) Find the distance between the points (3, 5) and (2, 7).

(a) the domain of $f(x)$;

(b) the range of $f(x)$;

(c) the x-intercept(s);

(d) the y-intercept;

(e) the interval(s) the the function is positive;

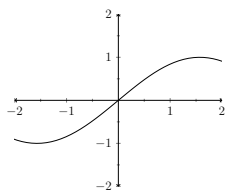
(f) the interval(s) the the function is negative;

(g) the local minima of $f(x)$;

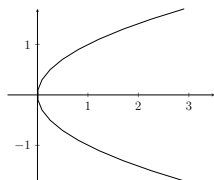
(h) the local maxima of $f(x)$;

26. (2 points) Which of the following curves are graphs of relations for which y is a function of x :

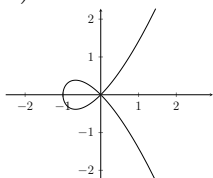
a)



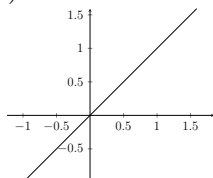
b)



c)



d)

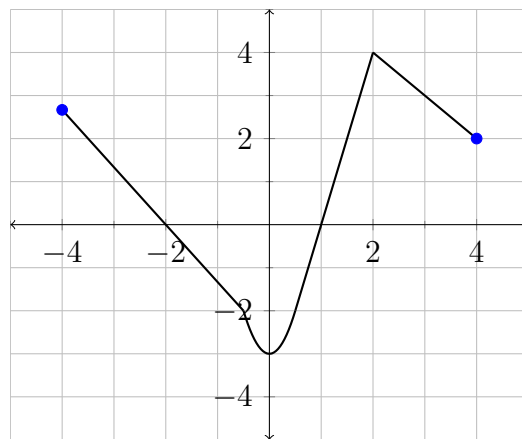


27. (5 points) Given $f(x) = x^2 - 3x + 4$ evaluate and simplify the following expressions

(a) $f(-1)$; (b) $f\left(\frac{2}{3}\right)$; (c) $f(\sqrt{3})$;

d) $f(x + h)$.

28. (4 points) For the function f , whose graph is given below, answer the following questions:



Answers:

1. a) 0, b) $3/2$ c) -2 ,

2. a) -8 , b) $-25y^2 + 64x - 64$,

3. \$800,

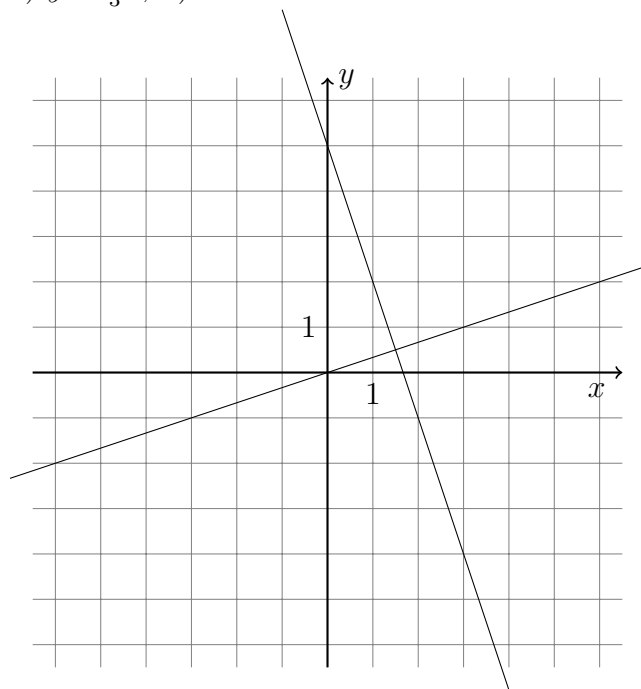
4. 3.2,

5. \$20,

6. a) $x = 19$, b) $x = 9/5$ c) $x = -1$;

7. a) $m = -2/3$, b) $y = -2/3x + 1/3$ c) $(1/2, 0)$;

8. a) $y = \frac{1}{3}x$, b)



9. $(3, 5)$;

10. $(2, -3)$;

11. a) $\frac{x^2z^6}{4y^{10}}$, b) $\frac{25}{4x^8y^4}$;

12. a) $(x - 1)(4x + 3)$, b) $x^2(1 + 3x)(1 - 3x + 9x^2)$;

13. No solutions;

14. a) $x = -5/3$, $x = 1$ b) $x = 2$, $x = 1$, c) $x = -2$,
 $x = 2$, $x = 7$;

15. $x = \frac{2 - \sqrt{7}}{6}$, $x = \frac{2 + \sqrt{7}}{6}$;

16. $x = -3 - \sqrt{6}$, $x = -3 + \sqrt{6}$;

17. No solutions;

18. a) $9\sqrt{3}$, b) $-10 - 2\sqrt{6}$, c) $5x^2y^3z\sqrt{2xyz}$, d)
 $\frac{3x^3y^3\sqrt{x}}{5}$;

19. a) $\frac{9\sqrt{2}(5 + 2\sqrt{2})}{17}$, b) $\frac{-3(x + \sqrt{x^2 + 20})}{20}$;

20. a) 4 , b) -3 ; c) -3 ;

21. a) $x = 2$, b) $x = -1$;

22. $x = 3/2$ and $x = 3\sqrt{3}/2$

23. $\sin \theta = \sqrt{3}/5$, $\cos \theta = \sqrt{22}/5$, $\tan \theta = \sqrt{66}/22$,
 $\sec \theta = 5\sqrt{22}/22$ and $\cot \theta = \sqrt{66}/3$,

24. $M(2, 1/2)$

25. $d = \sqrt{5}$

26. a) YES, b) NO, c) NO, d) YES;

27. a) 8, b) $22/9$, c) $7 - 3\sqrt{3}$, d) $x^2 + 2xh + h^2 - 3x - 3h + 4$;

28. a) $[-4, 4]$, b) $[-3, 4]$, c) $(-2, 0)$, $(1, 0)$, d)
 $(0, -3)$, e) $[-4, -2) \cup (1, 4]$, f) $(-2, 1)$, g)
 $f(0) = -3$, h) $f(2) = 4$.