

1. [4] Evaluate the following expressions.

a. $90 \div 3 - (4 + |3 - (-1)^{10} \cdot 2|)$

b. $\frac{(7^0 - 3^2)}{3} + \frac{1}{5} \div \left(\frac{2(5-4)}{1+|-4|} \right)$

2. [3] Expand and simplify the following algebraic expression.

$$5 + (x + 5)(3 - x) - (x + 3)^2$$

3. [8] Solve the following equations for x or show that there are no or infinitely many solutions.

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

b. $3(3x + 1) = 7 - [3(x + 2) - 12x]$

c. $\frac{x+1}{5} - \frac{x}{2} = \frac{x-6}{10}$

4. [4] Simplify the following expressions. Your answers should have no negative exponents.

a. $\frac{-2a^{-3}}{b^{-1}}$

b. $\left(\frac{16a^5b^{-8}c^7}{8a^{-2}b^{-3}c^5} \right)^3 \cdot a^3$

5. [3] Fully factor the following expression

$$3x^3 - 2x^2 - 27x + 18$$

6. [8] Solve for x by factoring

a. $25x^2 - 49 = 0$

b. $2x^2(3x - 1) = 4x$

7. [3] Solve (and fully simplify your final answer) for x using the quadratic formula, or state there is no solution, as applicable.

$$2x^2 + 6 = 1 - 8x$$

8. [8] Simplify the following expressions. Note that a simplified expression shouldn't contain negative exponents.

a. $\frac{\sqrt{2x^9y^7z^7}}{\sqrt{32x^3y^2z^9}}$

b. $5x\sqrt{27y^7} - 3y\sqrt{32y^2} - 3xy^2\sqrt{3y^3} - 5\sqrt{50y^4}$

9. [4] Rationalize the denominator and simplify.

a. $\frac{12}{\sqrt{48}}$

b. $\frac{2\sqrt{7}-3\sqrt{2}}{\sqrt{7}+\sqrt{2}}$

10. [6] Solve the following equations or show that there are no solutions.

a. $6 = \sqrt{8 - 4x}$

b. $x - \sqrt{x + 20} = 0$

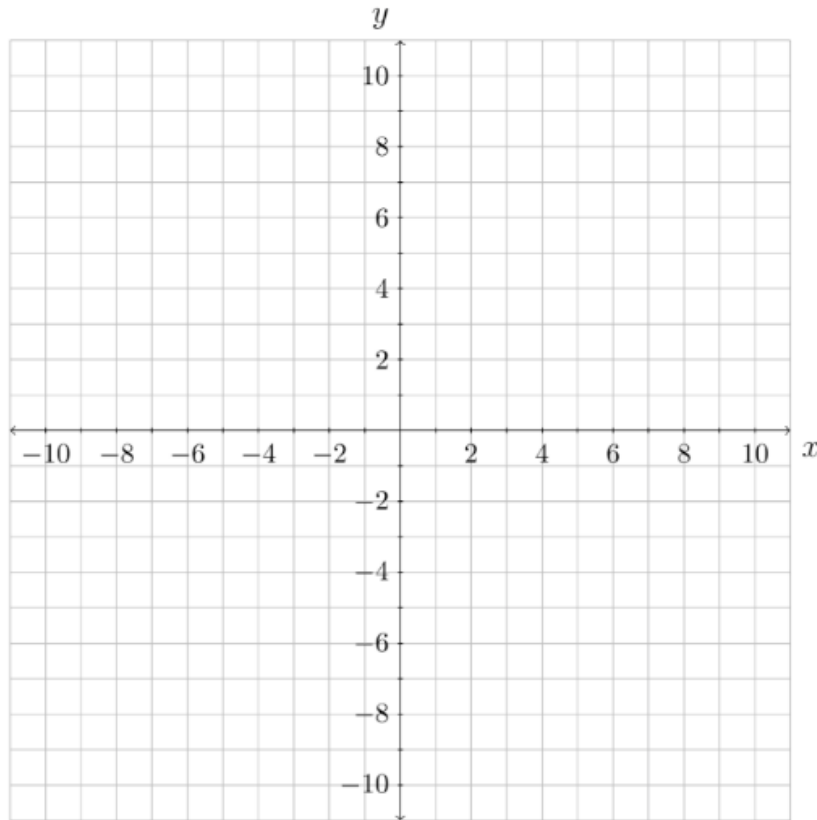
11. [2] Find the distance between the points $(2, -3)$ and $(-2, -7)$. Simplify your answer as much as possible.

12. [2] Find the midpoint between the points $(-2, 3)$ and $(\frac{5}{6}, -4)$. Simplify your answer as much as possible.

13. [4] For the line $2x + 4y = -8$, find:

a. The intercepts

b. Sketch the line on the given grid



14. [6] Given the points $A(-3, 11)$, $B(1, 5)$ and $C(6, 0)$

a. Write an equation of the line that passes through B and C

b. Write an equation of the line that passes through A and is parallel to the line $x = 4$

c. Write an equation of the line that passes through B and is perpendicular to the line $x + y = 4$

15. [3] Solve the linear system by the method of substitution.

$$x - 4y = 2$$

$$-x + 3y = 1$$

16. [3] Solve the linear system by the method of elimination.

$$-2x + 5y = 7$$

$$4x + 6y = 2$$

17. [6] Solve each equation for x .

a. $3 + 24 \cdot 2^{4x+1} = 9$

b. $10 - e^{2x} = 7$

18. [3] Evaluate the following expressions.

a. $\log_2 \left(\frac{1}{8} \right)$

b. $\ln e$

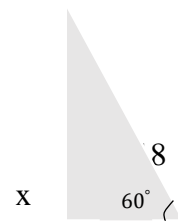
19. [3] If $\cos \theta = \frac{1}{4}$ for an acute angle θ in a right triangle, determine the following. In your final answer, fractions should be simplified, and denominators should be rationalized, where applicable.

a. $\sec \theta$

b. $\tan \theta$

20. [3] Evaluate and simplify: $(\cos 45^\circ)^2 + \tan 45^\circ$

21. [3] Use trigonometry to find the value of x in the triangle below. Simplify your answer as much as possible.



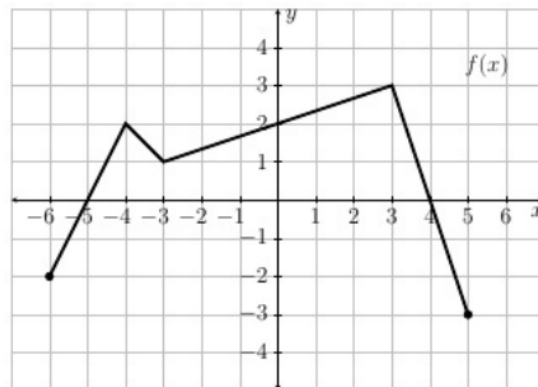
22. [4] Given $f(x) = x^2 - 2x - 5$, evaluate and simplify the following expressions.

a. $f(-3)$

b. $f(1 + \sqrt{6})$

23. [7] Given the graph of the function $f(x)$, determine the characteristics below.

- a. The domain of $f(x)$
- b. The range of $f(x)$
- c. The x -intercept(s)
- d. The y -intercept(s)
- e. The interval(s) over which $f(x)$ is positive
- f. The interval(s) over which $f(x)$ is increasing
- g. The local maxima.



Answers 1) a) 25 b) $-13/6$

2) $-2x^2 - 8x + 11$

3) a) $\frac{-1}{5}$ b) *No solution* c) 2

4) a) $\frac{-2b}{a^3}$ b) $\frac{8a^{24}c^6}{b^{15}}$

5) $(3x - 2)(x - 3)(x + 3)$

6) a) $\pm \frac{7}{5}$ b) $x = 0, x = \frac{-2}{3}, x = 1$

7) $\frac{-4 \pm \sqrt{6}}{2}$

8) a) $\frac{x^3 y^2 \sqrt{y}}{4z}$ b) $12xy^3 \sqrt{3y} - 37y^2 \sqrt{2}$

9) a) $\sqrt{3}$ b) $4 - \sqrt{14}$

10) a) $x = -7$ b) $x = 5$

11) $4\sqrt{2}$

12) $\left(\frac{-7}{12}, \frac{-1}{2}\right)$

13) a) $x = -4, y = -2$

14) a) $y = -x + 6$ b) $x = -3$ c) $y = x + 4$

15) $x = -10, y = -3$

16) $x = -1, y = 1$

17) a) $\frac{-3}{4}$ b) $\frac{\ln 3}{2}$

18) a) -3 b) 1

19) a) 4 b) $\sqrt{15}$

20) $\frac{3}{2}$

21) $9\sqrt{3}$

22) a) 10 b) 0

23) a) $[-6, 5]$ b) $[-3, 3]$ c) $x = -5, x = 4$ d) $y = 2$ e) $(-5, 4)$ f) $(-6, -4) \cup (-3, 3)$
g) local max. $(-4, 2)$ and $(3, 3)$