

1. Evaluate the following expressions.

[2] (a) $|3 - 2 \cdot (4^2 - 3^3)| - 3 \cdot 5^0$

[3] (b) $\frac{(-1)^{10} - (-1)^{11}}{8} + \frac{1}{3} \div \frac{5 - 7}{|2^0 - 2|}$

2. Simplify the following polynomial expressions.

[2] (a) $\frac{3}{2}x^3y + \frac{1}{5}x^3y^3 + \frac{1}{4}x^3y - x^3y^3$

[2] (b) $-3(x - 4) + 2(3 - 2x)(4 - x)$

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

[3] (a) $3(4 - x) = 8 - 6 \cdot [4x - (2 - x)]$

[3] (b) $\frac{3(x + 2)}{4} - \frac{3(2x - 1)}{8} = \frac{x + 6}{2} - \frac{x + 7}{3}$

[3] (c) $2(x + 2) - 5(x + 1) - 8 = \frac{-6x + 14}{2}$

4. Simplify the following expressions and present the results without negative exponents. You may assume that all variables are non-zero.

[1] (a) $(2x^{-4})^3$

[2] (b) $\frac{(15x^3y)(3x^2y)}{18xy^3}$

[2] (c) $\left(\frac{10x^{-4}y^2z^{-3}}{5x^2y}\right)^{-3}$

5. Factor the following polynomials completely.

[2] (a) $x^2 + x - 42$

[2] (b) $3x^2 - 7x - 20$

[3] (c) $3x^3 - 2x^2 - 48x + 32$

6. Solve each of the following equations by **factoring**.

[2] (a) $4x^2 - 36 = 0$

[4] (b) $x^2(2x + 1) = 6x$

[3] 7. Solve the following equation using **the quadratic formula**. Simplify your answer(s) completely.

$$3x^2 + 6 = 11x$$

8. Simplify each of the following expressions. You may assume that all variables represent positive numbers.

[3] (a) $\frac{\sqrt{8x^4y^9z^4}}{\sqrt{72xy^3z^{10}}}$

[3] (b) $3x\sqrt{75y^3} - 2\sqrt{27x^4} - 5y\sqrt{27x^2y} - 4x\sqrt{48x^2}$

9. Rationalize the denominator of each expression and simplify completely.

[2] (a) $\frac{18}{\sqrt{72}}$

[2] (b) $\frac{3\sqrt{5} + 2\sqrt{3}}{\sqrt{5} - \sqrt{3}}$

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

[3] (a) $2 + \sqrt{3x + 4} = 7$

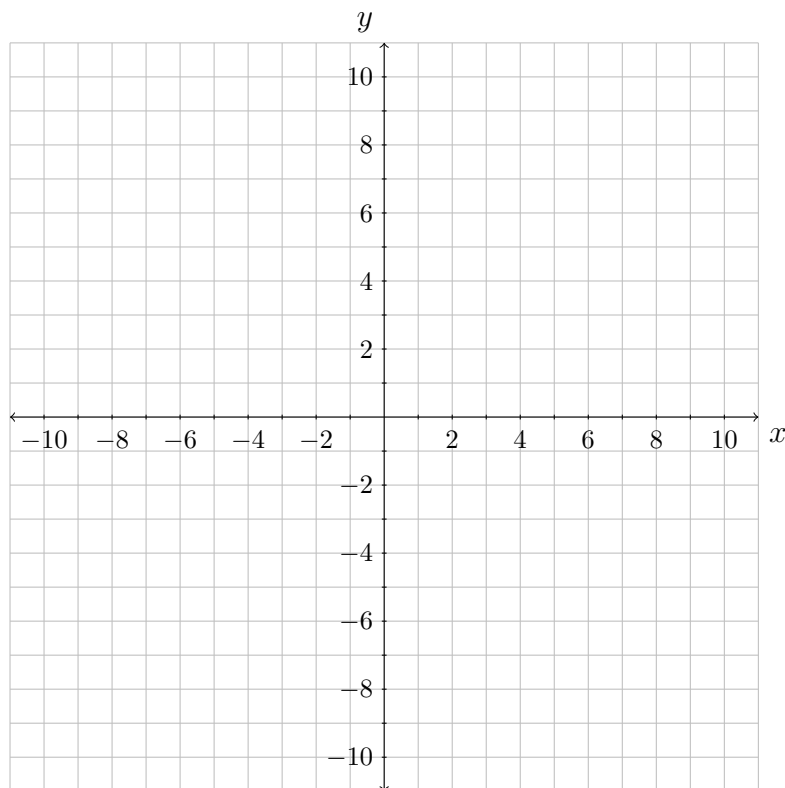
[3] (b) $x - \sqrt{3x + 10} = -2$

[2] **11.** Find the **distance** between the points $(3, 1)$ and $(-1, 5)$. Simplify your answer as much as possible.

[1] **12.** Find the **midpoint** between the points $(-5, 2)$ and $(3, -2/3)$. Simplify your answer as much as possible.

[1] **13.** Determine the y - intercept of the line $3y - 2x = 12$.

[2] **14.** Draw the line $y = -\frac{1}{3}x - 2$ on the given grid.



15. Find an equation for the line in each case.

[1] (a) The vertical line through the point $(-3, -2)$.

[3] (b) The line through the points $(-1, -3)$ and $(2, -6)$.

[3] (c) The line through the point $(-2, -5)$ which is parallel to the line $3x + 5y = 11$.

[3] **16.** Solve the following linear system by the method of **substitution**.

$$\begin{cases} 3x + 4y = 6 \\ 2x - y = -7 \end{cases}$$

- [3] **17.** Solve the following linear system by the method of **elimination**.

$$\begin{cases} 6x + 3y = -2 \\ x - 2y = 3 \end{cases}$$

- [2] **18.** Evaluate the following expression: $\log_3 \left(\frac{1}{9} \right) - 2 \log_7 1 - 3 \ln(e^{-2}) + \log_2 8$

- 19.** Solve each equation for x .

[3] (a) $4^{x-1} = 8^{2x-4}$

[3] (b) $e^{3x-1} - 5 = 10$

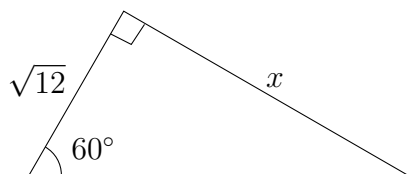
- [3] **20.** If $\sec \theta = \frac{3}{2}$ for an acute angle θ in a right triangle, determine and simplify/rationalize:

(a) $\sin \theta$

(b) $\cot \theta$

- [3] **21.** Evaluate and simplify: $\csc(45^\circ) - \frac{1}{2} \cos(60^\circ)$

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

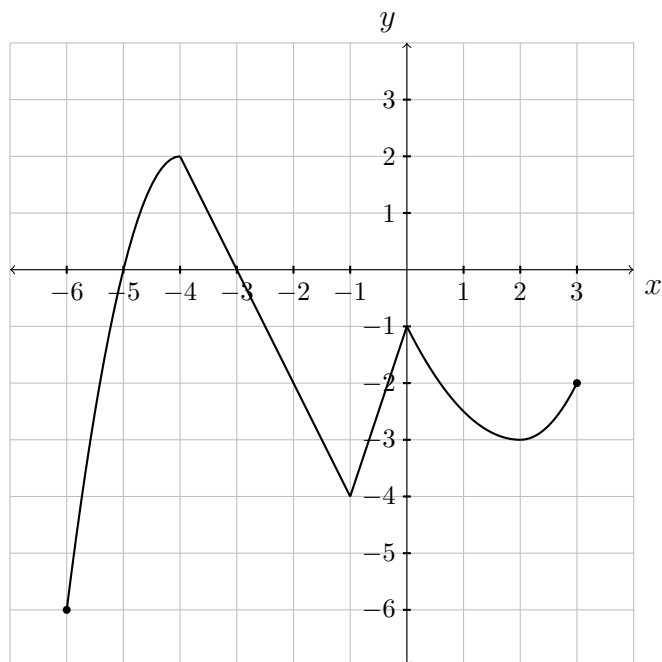


- 23.** Given $f(x) = 2 - 3x$ and $g(x) = x^2 - 2x - 1$, evaluate and simplify the following expressions.

[2] (a) $f(-1) - g(-3)$

[2] (b) $g(a+h) - g(a)$

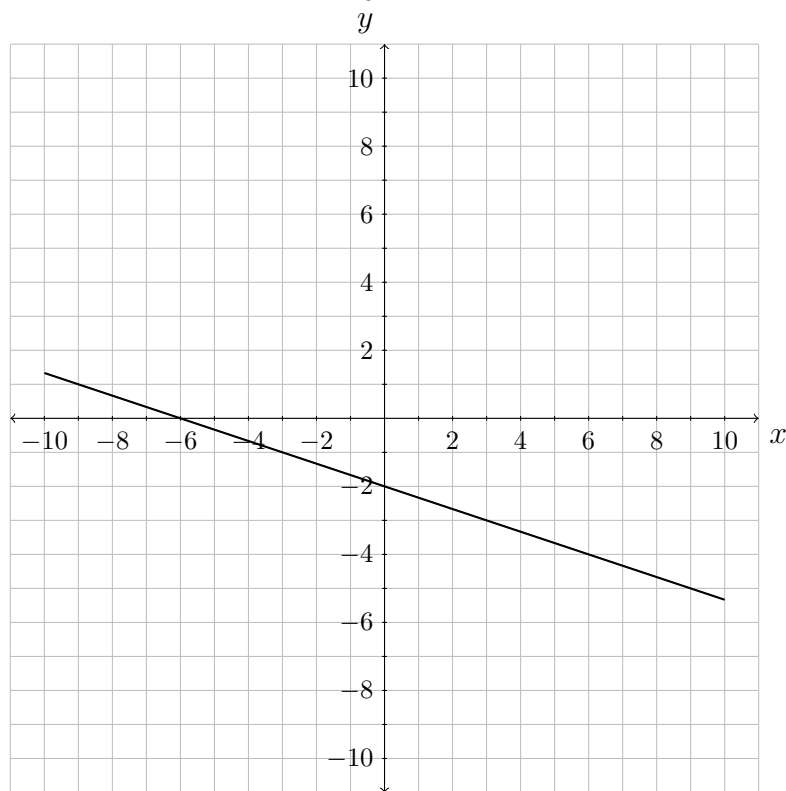
- [5] **24.** Given the graph of the function $f(x)$, determine the characteristics below.



- (a) the domain of $f(x)$;
- (b) the range of $f(x)$;
- (c) x -intercept(s)
- (d) Interval(s) over which $f(x)$ is positive
- (e) Interval(s) over which $f(x)$ is decreasing

Answers:

- 1.** a) 22, b) $\frac{1}{12}$, **2.** a) $\frac{7}{4}x^3y - \frac{4}{5}x^3y^3$, b) $4x^2 - 25x + 36$, **3.** a) $\frac{8}{27}$, b) $\frac{29}{4}$, c) no solution, **4.** a) $\frac{8}{x^{12}}$,
b) $\frac{5x^4}{2y}$, c) $\frac{x^{18}z^9}{8y^3}$, **5.** a) $(x+7)(x-6)$, b) $(3x+5)(x-4)$, c) $(3x-2)(x-4)(x+4)$, **6.** $x=3, x=-3$,
b) $x=0, x=\frac{3}{2}, x=-2$, **7.** $x=3, x=\frac{2}{3}$, **8.** a) $\frac{y^3x\sqrt{x}}{3z^3}$, b) $-22x^2\sqrt{3}$, **9.** a) $\frac{3\sqrt{2}}{2}$, b) $\frac{21+5\sqrt{15}}{2}$, **10.** a) $x=7$,
b) $x=2$, **11.** $4\sqrt{2}$, **12.** $(-1, \frac{2}{3})$, **13.** $y=4$, **14.**



- 15.** a) $x=-3$, b) $y=-x-4$, c) $y=-\frac{3}{5}x-\frac{31}{5}$, **16.** $x=-2, y=3$, **17.** $x=\frac{1}{3}, y=-\frac{4}{3}$, **18.** 7,
19. a) $x=\frac{5}{2}$, b) $x=\frac{1+\ln 15}{3}$, **20.** a) $\frac{\sqrt{5}}{3}$, b) $\frac{2\sqrt{5}}{5}$, **21.** $\sqrt{2}-\frac{1}{4}$, **22.** $x=6$, **23.** a) -9, b) $h^2+2ah-2h$,
24. a) $D=[-6, 3]$, b) $R=[-6, 2]$, c) $x=-5, x=-3$, d) $(-5, -3)$, e) $(-4, -1) \cup (0, 2)$.