

1. Find the product $(x - 3)(x^2 + 3x + 9)$

- (a) $x^3 + 6x^2 + 9x + 27$
- (b) $x^3 - x^2 + 3x + 27$
- (c) $x^3 + 6x - 27$
- (d) $x^3 - 27$
- (e) $x^3 + 27$

2. Simplify the expression $(16a^4b^{-2})^{\frac{1}{2}}(a^3b)^{-2}$

- (a) $\frac{4}{a^4b^3}$
- (b) $\frac{ab^3}{8}$
- (c) $\frac{a^4}{4b^3}$
- (d) $\frac{8b^2}{a^2}$
- (e) $4ab$

3. Solve the equation $4x - 2(1 + x) = 3(2x + 1) - 5$

- (a) -2
- (b) 0
- (c) 1
- (d) 2
- (e) 4

4. Factor the polynomial completely $x^3 - 3x^2 - 16x + 48$

- (a) $(x + 2)(x - 2)(x - 3)$
- (b) $(x + 4)(x - 4)(x - 3)$
- (c) $(x + 2)(x - 2)(x + 3)$
- (d) $(x + 4)(x - 4)(x + 3)$
- (e) $(x^2 + 16)(x + 3)$

5. Find the slope of the line that goes through the points (6, -4) and (3, -2)

- (a) $-\frac{3}{2}$
- (b) $-\frac{2}{3}$
- (c) $-\frac{1}{2}$
- (d) -2
- (e) Undefined

6. Find $f(-3) + f(3)$ for the given function $f(x) = \begin{cases} 2x - 1 & \text{if } x \leq -1 \\ x^2 + 1 & \text{if } x > -1 \end{cases}$

- (a) 15
- (b) 5

- (c) 3
- (d) 0
- (e) -5

7. Find the domain of the function $f(x) = \sqrt{12 - 3x^2}$

- (a) $x \geq 4$
- (b) $x \leq -3$
- (c) $-2 \leq x \leq 2$
- (d) $-3 \leq x \leq 3$
- (e) $x \leq -2, x \geq 2$

8. Which of following is an odd function?

- (a) $f(x) = 1 - x$
- (b) $f(x) = 3x^2 - 5$
- (c) $f(x) = x^3 + 5x - 11$
- (d) $f(x) = 2x^3 - 4x^5$
- (e) $f(x) = -\frac{1}{x^2 - 1}$

9. Perform the indicated operation and simplify: $\frac{2}{(x-3)(x-2)} - \frac{1}{(x-3)(x+1)}$

- (a) $\frac{1}{(x+1)(x-2)(x-3)}$
- (b) $\frac{x+4}{(x+1)(x-2)(x-3)}$
- (c) $\frac{x}{(x-2)(x-3)}$
- (d) $\frac{4}{(x+1)(x-2)}$
- (e) $x+2$

10. Solve the inequality $-5 \leq 1 - 3x < 10$ and express the answer in interval notation

- (a) $[-3, 2]$
- (b) $[-3, 2)$
- (c) $(-3, 2]$
- (d) $(-\infty, -3] \cup (2, \infty)$
- (e) $(-\infty, -3) \cup [2, \infty)$

11. Which of following has its inverse function?

- (a) $x^2 + y^2 = 4$
- (b) $y = x(x-1)(x+1)$
- (c) $y = \frac{1}{x^2}$

(d) $y = |x + 2|$

(e) $y = \sqrt{x}$

12. How can the graph of $y = (x + 1)^3 - 2$ be obtained from the graph of $y = x^3$?

(a) Shift to the left by 1 unit and down by 1 unit

(b) Shift to the left by 1 unit and down by 2 units

(c) Shift to the left by 2 units and up by 1 unit

(d) Shift to the right by 1 unit and up by 2 units

(e) Shift to the right by 2 units and down by 1 unit

13. What is the midpoint of the segment connecting (1, -4) and (3, 2)?

(a) (-1, -3)

(b) (-1, -1)

(c) (0, 1)

(d) (2, -3)

(e) (2, -1)

14. Solve the equation $\left(\frac{1}{9}\right)^{x-1} = 3^{2x+6}$?

(a) -1

(b) -2

(c) -4

(d) 3

(e) 5

15. Which of following is definitely NOT a zero of the polynomial function

$$f(x) = 3x^5 - 2x^3 + 4x^2 - 6x + 7?$$

(a) -1

(b) $\frac{1}{3}$

(c) $-\frac{3}{7}$

(d) 1

(e) 7

16. Solve the equation $x^{\frac{3}{2}} = 27$

(a) $\frac{1}{3}$

(b) 9

(c) 18

(d) $9\sqrt{3}$

(e) $\sqrt[3]{27}$

17. For $f(x) = x^2 + 1$ and $g(x) = \sqrt{x - 3}$, find $g \circ f(x)$?

(a) $\sqrt{x^2 - 2}$

(b) $x - 3$

(c) $\sqrt{x^2 - 3} + 1$

(d) $x - 2$

(e) $x^2 + 3$

18. Let $f(x) = (x-1)(x+3)$ and $g(x) = x+2$. Find the domain of $\frac{f}{g}(x)$.

- (a) $(-\infty, \infty)$
- (b) $(0, \infty)$
- (c) $(-3, -2) \cup (-2, 1)$
- (d) $(-\infty, -2) \cup (-2, \infty)$
- (e) $(-\infty, -3) \cup (-3, \infty)$

19. Simplify the rational expression $\frac{\frac{3}{x} + \frac{1}{2}}{1 - \frac{5}{x}}$

- (a) $\frac{3}{10}$
- (b) $\frac{3x+2}{5x-1}$
- (c) $\frac{2x+3}{5x-2}$
- (d) $\frac{x+6}{2x-10}$
- (e) $\frac{3x+1}{2x-1}$

20. Find the equation of the line that passes through the point $(5, -9)$ and is perpendicular to the line $2x - 3y + 5 = 0$.

- (a) $x + y + 4 = 0$
- (b) $2x - 3y + 17 = 0$
- (c) $2x + 3y - 7 = 0$
- (d) $3x - 2y - 6 = 0$
- (e) $3x + 2y + 3 = 0$

21. Find $f^{-1}(3)$ for $f(x) = \frac{x}{3x+4}$.

- (a) $-\frac{3}{2}$
- (b) -1
- (c) $\frac{1}{3}$
- (d) $\frac{1}{2}$
- (e) 1

22. A quadratic function has its vertex at the point $(-2, 5)$. If $(1, 4)$ is also a point on the graph of the function, which of the following is the equation of the function?

- (a) $y = \frac{1}{3}(x-2)^2 + 5$
- (b) $y = -\frac{1}{3}(x+2)^2 + 5$
- (c) $y = \frac{1}{4}(x+2)^2 + 1$
- (d) $y = \frac{1}{9}(x-2)^2 + 5$