1. Simplify the following. Express answers in terms of positive exponents.

   a) \((2a^{-3}b^2)^{-2}\)   
   b) \(\left(\frac{x^2}{y^4}\right)^{-3}\)   
   c) \(\frac{4x^{-3}y^{-5}}{6x^{-4}y^3}\)   
   d) \(\left(\frac{m^{-3}m^3}{n^{-2}}\right)^{-2}\)   
   e) \(\left(x^4y^{-1}\right)^2\)

   f) \((27x^3)^{2/3}\)   
   g) \(\left(16x^8y^{-4}\right)^{1/4}\)   
   h) \(\left(\frac{x^{-1/3}y^{1/2}}{x^{-1/4}y^{1/3}}\right)^6\)

2. Perform the indicated operations and simplify when needed.

   a) \(\frac{2x^3 - 3x^2 + x + 5}{2x^2 + x - 1}\)   
   b) \(\frac{2x^3 - 3x^2 + x + 5}{2x^2 + x - 1}\)

   c) \(\frac{2x^3 - 3x^2 + x + 5}{2x^2 + x - 1}\)   
   d) \((2x + 3y)^2\)   
   e) \((2x - 3y)^2\)

   f) \((2x + 3y)(2x - 3y)\)   
   g) \((3x + 2)(4x - 3)\)   
   h) \(2x^2 + x - 1\)

   i) Find the quotient and remainder when \(3x^3 + x + 1\) is divided by \(x + 1\).

3. Factor the following expressions by integers.

   a) \(6x^4 - 8x^3 - 2x^2\)   
   b) \(5x(x + 1) - 3(x + 1)\)   
   c) \(2x^2 - 4xy - 3x + 6y\)

   d) \(x^2 + 5x - 6\)   
   e) \(m^2 - 6m + 8\)   
   f) \(2x^2 + 5x - 3\)

   g) \(25x^2 - 16y^2\)   
   h) \(x^2 + 10xy + 25y^2\)   
   i) \(9x^2 - 6x + 1\)

   j) \(x^2 + 81\)

   k) \(9(x + 1)^2(3x - 2)^2 + 2(x + 1)(3x - 2)^3\)

4. Perform the indicated operations and simplify your answers.

   a) \(\frac{x + 3}{x - 3} + \frac{3}{3 - x}\)   
   b) \(\frac{y - 3}{y^2 - 4} - \frac{y + 2}{y^2 - 4y + 4} - \frac{2}{2 - y}\)

   c) \(\frac{x + 1}{x - x} - \frac{x^2 - 2x + 1}{x^2 - 1}\)

5. Simplify the following radicals:

   a) \(\sqrt[3]{12x^3y^5z^2}\)   
   b) \(\sqrt[3]{\frac{8a^7}{27b^3}}\)

6. Express the following using radical notation:

   (a) \(m^{2/3}\)   
   (b) \(\sqrt[2/7]{7x^2y}\)

   Express the following in terms of rational exponents:

   c) \(\sqrt[4]{x^3}\)   
   d) \(7m\sqrt{m^2}\)   
   e) \(\left(\sqrt{(x+1)^3}\right)^5\)
7. Rationalize the denominator in each of the following.

(a) \( \frac{5}{\sqrt{5x}} \)  
(b) \( \frac{1}{\sqrt{x} - 1} \)  
(c) \( \frac{1}{\sqrt{x + 2} + 1} \)

In 8–21, solve the equations for \( x \).

8. \( 3x + 11 - (6x - 11) = 0 \)
9. \( 5(x - 2) + 3(3x - 1) = 4(x - 3) + 7x \)
10. \( 11x = 2x^2 + 12 \)
11. \( 4u^2 = 8u \)
12. \( 25x^2 - 9 = 0 \)
13. \( x^3 - 3x^2 + 2x = 0 \)
14. \( x^5 = 7 \)
15. \( x^2 - 10x - 3 = 0 \)
16. \( 2x^2 + 1 = 4x \)
17. \( \frac{2}{x^2 - 9} - \frac{3}{x - 3} = \frac{1}{x + 3} \)
18. \( \frac{x}{x - 2} - 3 = 0 \)
19. \( \sqrt{x - 4} - 5 = 0 \)
20. \( \sqrt{2x + 1} - \sqrt{x + 4} = 1 \)
21. \( x^4 - 7x^2 + 10 = 0 \)
22. \( \frac{x - 2}{2x + 7} = 3 \)
23. \( x - \frac{27}{\sqrt{x}} = 0 \)

In 24–26, solve the inequalities and graph the solutions. Express the solutions in interval notation.

24. \( -4x - 5 \leq 0 \)
25. \( \frac{x + 2}{x - 3} \leq 0 \)
26. \( x^2 + 21 > 10x \)

27. Find an equation of the line passing through the points \( P_1(-4,-4) \) and \( P_2(-5,2) \).

28. Graph the lines \( y = 2x - 3 \), \( y = -2x + 3 \), \( y = -4 \), and \( x = 2 \). Clearly label any intercepts.

29. Find an equation of the line whose graph is

![Graph of a line](image)

In 30 & 31, find the axis of symmetry and vertex of the parabola. Find the \( x \)-intercepts and the \( y \)-intercept of the parabola. Graph the parabola clearly labeling the vertex, the axis of symmetry and the intercepts.

30. \( y = -x^2 - 2x + 3 \)
31. \( y = x^2 - 2x - 3 \)

32. Solve the following systems of equations:

(a) \( 2x - 3y = 7 \)
(b) \( 7x - 5y = -1 \)
(c) \( 3x - y = 1 \)

33. Solve the following equation and inequalities:

(a) \( |x + 2| = 5 \)
(b) \( |x + 2| < 5 \)
(c) \( |x + 2| \geq 5 \)