1 Do five of the following six problems: 1–6

1. Find all solutions to the equation \( \frac{1}{3} + \frac{2}{x-1} = 3 \).

2. Evaluate and simplify the following expressions
   (a) \( 64^{-\frac{2}{3}} \)
   (b) \( 4\sqrt{\frac{1}{16}} \)

3. Rewrite \( -\frac{x}{2x-8} + \frac{3x-4}{x^2-4x} \) as one completely reduced fraction.

4. Simplify \( \frac{8x^3y^{-4}}{(2x^2y^2)^{\frac{3}{2}}} \) and eliminate negative exponents.

5. Perform the multiplication \( u^\frac{3}{2}(\sqrt{u} - \frac{1}{\sqrt{u}}) \) and simplify as much as possible.

6. Factor each of the following completely.
   (a) \(-2t^2 + 12t - 18\)
   (b) \(1 - 9x^2\)

2 Do five of the following six problems: 7–12

7. Perform the division \( \frac{x^2-4}{x+4} \div \frac{x^2-3x-4}{x^2+5x+6} \) and simplify completely.

8. Rewrite \( \frac{1+\frac{1}{x}}{1-\frac{1}{x}} \) as a simplified reduced fraction.

9. Simplify each of the following completely.
   (a) \( \sqrt{50a^{10}} \)
   (b) \( 125^{-\frac{3}{4}} + 8^{-\frac{1}{2}} \)

10. Find the center and the radius of the circle with equation \( x^2 + y^2 - 3x + 14y + 44 = 0 \).

11. Solve \( 2x + \sqrt{2 - x} = 1 \)

12. (a) Find an equation of the line passing through the points \((-1, 2)\) and \((3, -4)\).
    (b) Find an equation of a line with x-intercept 2 and y-intercept -3.

3 Do five of the following six problems: 13–18

13. Sketch the graph of the function \( f(x) = -\sqrt{x+9} \). Label at least three points on the graph, including all intercepts.

14. Divide \( 2x^3 - 7x^2 + 5 \) by \( x - 3 \). Find the quotient and remainder.

15. Sketch the graph of \( y = x^2 + 4x + 5 \). Label at least three points on the graph, including all intercepts and the vertex.

16. Given \( g(x) = 5 - 2x - x^2 \). Evaluate and simplify the following.
    (a) \( g(-2) \).
    (b) \( g(12 - a) \).

17. The measure of an angle is \( A = 310^\circ \). Find two positive angles and two negative angles that are coterminal with \( A \).

18. Find the radius \( r \) of the circle if an arc of length 12m on the circle subtends a central angle of \( \frac{3\pi}{5} \) radians.
4 Do five of the following six problems: 19–24

19. Find the exact values
   \( (a) \ \tan(-\frac{2\pi}{3}) \)
   \( (b) \ \sin 210^\circ \)

20. If \( \cos \theta = \frac{5}{\sqrt{54}} \) and \( \theta \) is an acute angle, find \( \tan \theta \).

21. Solve the system of equations
   \[
   \begin{aligned}
   x + y &= 2 \\
   x^2 - y^2 &= 4.
   \end{aligned}
   \]
   or show that it is inconsistent.

22. The sum of two numbers is twice their difference. The larger number is four more than the smaller number. Find the numbers.

23. Solve the system of equations
   \[
   \begin{aligned}
   3x + 2y &= 0 \\
   -x - 2y &= 8.
   \end{aligned}
   \]
   or show that it is inconsistent.

24. If three sides of a triangle are of length 3 cm, 4 cm, and 5 cm, find the cosine of the smallest angle.