Tasks 02-04 - Fractional, Radical & Cubic Equations

Section 02: Equations & Problem-Solving Strategies

Instructions

Complete these problems to master solving fractional, radical, and cubic equations. Pay special attention to domain restrictions and checking for extraneous solutions.

Problem 1: Domain Restrictions (x)

For each rational equation, identify the domain restrictions BEFORE solving:

a) $\frac{5}{x-3} = 2$

b) $\frac{x}{x+2} + \frac{3}{x-1} = 1$

c) $\frac{2x}{x^2-4} = \frac{1}{x-2}$

d) $\frac{1}{x} + \frac{1}{x^2} = \frac{1}{2}$

e) $\frac{x+1}{x-3} = \frac{x-2}{x+3}$

Problem 2: Solving Rational Equations (x)

Solve each equation, checking domain restrictions:

a) $\frac{4}{x} - \frac{3}{2x} = \frac{1}{4}$

b) $\frac{x+2}{x-1} - \frac{x-1}{x+2} = 0$

c) $\frac{2}{x-3} + \frac{x}{x+3} = \frac{12}{x^2-9}$

d) $\frac{1}{x-2} + \frac{2}{x+1} = \frac{3}{x-2}$

Problem 3: Basic Radical Equations (x)

Solve each radical equation and check for extraneous solutions:

a) $\sqrt{x+5} = 3$

b) $\sqrt{2x-1} = x-2$

c) $\sqrt{x^2+3} = 2$

d) $x = \sqrt{x+6}$

e) $\sqrt{4x+1} = 2x-1$

Problem 4: Multiple Radicals (xx)

Solve equations with multiple radical terms:

a) $\sqrt{x+3} + \sqrt{x} = 3$

b) $\sqrt{2x+5} - \sqrt{x+2} = 1$

c) $\sqrt{x+8} = 2 + \sqrt{x}$

Problem 5: Cubic Factoring (xx)

Factor and solve each cubic equation:

a) $x^3 + x^2 - 6x = 0$

b) $x^3 - 3x^2 - 4x + 12 = 0$

c) $x^3 + 3x^2 - 13x - 15 = 0$

Problem 6: Work Rate Problem (xx)

Two pipes can fill a tank together in 4 hours. The larger pipe alone can fill it 3 hours faster than the smaller pipe alone.

a) Set up the equation with appropriate variables
b) Identify domain restrictions
c) Solve for the individual filling times
d) Verify your answer makes practical sense

Problem 7: Investment Returns (xxx)

An investor divides €10,000 between two funds. Fund A returns interest at rate r%, while Fund B returns at rate $(r + 2)$%. After one year, the total interest earned is €650, if the amount in Fund B is €2,000 more than in Fund A:

a) Set up equations for the investment amounts and returns
b) Find the interest rates for both funds
c) Calculate the exact amounts invested in each fund
d) What would the total return be if all money was in Fund B?