

9.3 Connecting Graphs and Rational Equations

Solving Rational Functions:

Definitions:

Roots of an equation: The roots (or zeros) of an equation are the solution to an equation that is set to 0.

x-intercepts of an equation: The value of x that where the graph passes through the x-axis.

A. Algebraically:

Steps:

1. State restrictions on domain
2. Multiply both sides by the Lowest Common Denominator and simplify where necessary.
3. Expand and simplify
4. Set one side to zero and solve.

Example 1: Solve algebraically

a.) $\frac{x+2}{x-3} = x - 6$

$$\text{b.) } x + \frac{6}{x+2} = 5$$

$$\text{c.) } \frac{x-2}{x+3} - 1 = \frac{3}{x+2}$$

$$d.) \frac{x+5}{x+8} = 1 + \frac{6}{x+1}$$

$$e.) \frac{x+3}{2x-6} = 2x - \frac{x}{3-x}$$

B. Graphically:

Method 1: Finding roots/x-intercept

Steps:

1. Set one side to zero
2. Set equation as y_1 .
3. Use roots to solve the x-intercepts
4. Repeat for each root.

Method 2: Finding intersections

Steps.

1. Set $y_1 =$ Left-hand side
2. Set $y_2 =$ Right-hand side
3. Find the intersection point
4. Repeat for each point.

Example 2:

Solve graphically: Express answers to the nearest hundredth.

a.) $x + \frac{6}{x+2} = 5$

b.) $\frac{14}{x} = x - 5$

c.) $2 - \frac{3x}{2} = \frac{1+4x-x^2}{4x+10}$