



Appendix 2: Solutions

Lesson 5.1: Introduction to Rational Expressions



Practice Solutions – I

1. Determine the non-permissible values for the rational expressions.

a. $\frac{44}{p-5}$

$$p-5 \neq 0$$

$$p \neq 5$$

b. $\frac{4x-1}{3x^2-5x+2}$

$$\frac{4x-1}{3x^2-5x+2} = \frac{4x-1}{(3x-2)(x-1)}$$

$$3x-2 \neq 0 \quad x-1 \neq 0$$

$$x \neq \frac{2}{3} \quad x \neq 1$$

2. Simplify the rational expressions, and state any non-permissible values.

a. $\frac{9w^2xy^3}{12wx^3y^3}$

$$\text{NPVs: } w \neq 0, x \neq 0, y \neq 0$$

$$\frac{9w^2xy^3}{12wx^3y^3} = \frac{3w}{4x^2}, w \neq 0, x \neq 0, y \neq 0$$

$$\text{b. } \frac{20a^2b - 25ab^2}{16a^2 - 25b^2}$$

$$\frac{20a^2b - 25ab^2}{16a^2 - 25b^2} = \frac{5ab(4a - 5b)}{(4a - 5b)(4a + 5b)}$$

NPVs:

$$4a - 5b \neq 0 \quad 4a + 5b \neq 0$$

$$a \neq \frac{5}{4}b \quad a \neq -\frac{5}{4}b$$

$$\frac{5ab(4a - 5b)}{(4a - 5b)(4a + 5b)} = \frac{5ab}{4a + 5b}, a \neq \pm \frac{5}{4}b$$

$$\text{c. } \frac{2x^2 - 5x + 3}{5x^2 - 3x - 2}$$

$$\frac{2x^2 - 5x + 3}{5x^2 - 3x - 2} = \frac{(2x - 3)(x - 1)}{(5x + 2)(x - 1)}$$

NPVs:

$$5x + 2 \neq 0 \quad x - 1 \neq 0$$

$$x \neq -\frac{2}{5} \quad x \neq 1$$

$$\frac{(2x - 3)(x - 1)}{(5x + 2)(x - 1)} = \frac{2x - 3}{5x + 2}, x \neq -\frac{2}{5}, 1$$

3. Two students, Matt and Quinn, simplified the rational expression $\frac{6x^2 + 13x - 5}{2x^2 + 3x - 5}$. Matt's answer is $\frac{3x - 1}{x - 1}, x \neq 1$ and Quinn's answer is $\frac{3x - 1}{x - 1}, x \neq 1, -\frac{5}{2}$. Who is correct, and why?

$$\frac{6x^2 + 13x - 5}{2x^2 + 3x - 5} = \frac{(3x - 1)(2x + 5)}{(2x + 5)(x - 1)}$$

$$= \frac{3x - 1}{x - 1}$$

NPVs are determined before any simplification occurs!

$$x \neq 1, -\frac{5}{2}$$

Because the factor $2x + 5$ is in the denominator, it must be considered as a possible source for NPVs; therefore, Quinn's answer is correct.

4. The volume of a cone is $d^2 - 3d - 10$. If the radius of the cone is $d - 5$, write a simplified rational expression that represents the height of the cone. Recall the formula for volume of a cone is $V = \frac{\pi r^2 h}{3}$, where h is the height and r is the radius.

Rewrite the formula to isolate h .

$$V = \frac{\pi r^2 h}{3}$$

$$\frac{3V}{\pi r^2} = h$$

Substitute the given expressions for volume and radius into the formula.

$$h = \frac{3V}{\pi r^2}$$

$$h = \frac{3(d^2 - 3d - 10)}{\pi(d - 5)^2}, d \neq 5$$

$$h = \frac{3(d - 5)(d + 2)}{\pi(d - 5)(d - 5)}$$

$$h = \frac{3(d - 5)(d + 2)}{\pi(d - 5)(d - 5)}$$

$$h = \frac{3(d + 2)}{\pi(d - 5)}, d \neq 5$$

Please complete *Lesson 5.1 Explore Your Understanding Assignment* located in *Workbook 5A* before proceeding to *Lesson 5.2*.