**Grade 11 Review – Rational Expressions**

Warm-Up

Factor the following:

a) x2 – 4x – 32 b) 4x2 – 64 c) 3x2y + 6xy2

d) 6x2 + x – 2 e) 2x2 + 8x – 10 f) x2 – y2 – 6y – 9

Restrictions

Consider the following two equations:

Equation 1 Equation 2

$y=\frac{3x(x-1)}{(x-1)}$ $y= 3x$

Are these two equations equivalent? Explain.

How can the two equations be made to be equivalent?

When a restriction is embedded into an expression it is referred to as an \_\_\_\_\_\_\_\_\_ restriction. When the restriction is written outside the expression it is referred to as an \_\_\_\_\_\_\_ restriction.

Example 1

State all restrictions (implicit and explicit) for each expression below:

a)  b)  c) 

When simplifying an expression, it is critically important to state all implicit restrictions that are removed through the simplifying process.

Example 2

Simplify the following rational expressions.

a)  b) 

c)  d) 

e)  f)

Practice - Rational Expressions

1. Factor the following expressions:
2. x2 – x – 12 b) 9x2 - 4 c) 8xy2 – 4xy + 6x2y

d) 2x2 - 16x + 30 e) 4x2 + 20x + 24 f) 6x2 + 13x - 5

2. State all restrictions for the following expressions:

a) $\frac{ x+5}{x+2}×\frac{x-3}{2x-5}$ b) $\frac{2x}{x-3}+\frac{3}{2x^{2}+5x-3}$ c) $\frac{5}{x-y}÷\frac{2x}{3x-6}$

3. Simplify the following rational expressions:

a) $\frac{2x}{x+3}+\frac{4}{x}$ b) $\frac{3}{x^{2}-x-6}-\frac{4}{x^{2}-2x-3}$ c) $\frac{3x}{x^{2}-2x}÷\frac{y}{x^{2}-4}$

d) $\frac{3x}{x^{2}+6x+8}×\frac{x^{2}-4}{x+3}$ e) $\frac{2}{x+1}+\frac{3x}{x-5}÷\frac{x^{2}+x}{10-2x}$ f) $\frac{1}{m}+m+\frac{1}{n}$

4. Simplify. State all restrictions on the variables.

$$\frac{\frac{m^{2}-mn}{6m^{2}+11mn+3n^{2}}÷\frac{m^{2}-n^{2}}{2m^{2}-mn-6n^{2}}}{\frac{4m^{2}-7mn-2n^{2}}{3m^{2}+7mn+2n^{2}}}$$

Solutions

 1a) (x - 4)(x + 3) b) (3x - 2)(3x + 2) c) 2xy(4y – 2 + 3x)

 d) 2(x - 3)(x - 5) e) 4(x + 2)(x + 3) f) (3x - 1)(2x + 5)

 2a) $x\ne -2, \frac{5}{2}$ b) $x\ne \pm 3, \frac{1}{2}$ c) $x\ne y, x\ne 0, 2$

 3a) $\frac{2(x^{2}+2x+6)}{x(x+3)}$ b) $\frac{-(x+5)}{(x+1)(x+2)(x-3)}$ c) $\frac{3(x+2)}{y}, x\ne 0, 2$

 d) $\frac{3x(x-2)}{(x+3)(x+4)}, x\ne -2$ e) $\frac{-4}{x+1},x\ne 0,5$ f) $\frac{m^{2}n+m+n}{mn}$

 4 $\frac{m(m+2n)}{(m+n)(4m+n)}, m\ne -\frac{n}{3}, -\frac{3n}{2}, 2n, n, -n, -2n, -\frac{n}{4}$