Math 3 Unit 4 Obj 1: Simplifying Rational Expressions **NOTES**

An expression of the form $\frac{polynomial}{polynomial}$ is a **rational expression**.

The simplified form of a rational expression is when the numerator and denominator have **no common factor** other than 1. To simplify a rational expression, divide out common factors from the numerator and denominator.

A rational expression is **undefined when the denominator is 0**. A value of a variable for which a rational expression is undefined is an excluded value.

[1-5] Simplify the rational expression. State any excluded values.

Steps

1. Completely factor the numerator and denominator
   *gcf factoring
   *trinomial factoring
   *difference of squares
2. Determine the excluded values
   *set the **original** factored form of the denominator equal to 0
3. Divide out the common factor(s)

1. $\frac{4x-8}{x^2+6x-16}$

2. $\frac{5x^2-15x}{x^2-6x+9}$

3. $\frac{2x^3+10x}{x^2+5}$

4. $\frac{21a^2b^4}{7a^3b^2}$

5. $\frac{18y^2}{4y+8}$

The numerator and denominator of $\frac{x-4}{4-x}$ are opposites. To simplify the expression, you can factor -1 from $4-x$ to get $-1(-4+x)$, which can rewrite as $-1(x-4)$. Then simplify $\frac{x-4}{-1(x-4)}$ to -1.

Recognizing Opposite Factors:

[1-4] Simplify the following:

1. $\frac{2-x}{x-2}$

2. $\frac{3+x}{x+3}$

3. $\frac{x-4}{x+4}$

4. $\frac{x-5}{5-x}$

[5-8] Simplify the rational expression. State any excluded values.

5. $\frac{4-x^2}{7x-14}$

6. $\left(\frac{f}{g}\right)(y)$ if $f(y)=3-3y$ and $g(y)=2y^2-2$

7. $\frac{64-w^3}{w^2-8w+16}$

8. $\frac{m^2-2m-1m+2}{4-2m}$