Section 4.2: Simplifying Rational Expressions

Simplifying Rational Expressions

The common factors in rational expressions can be reduced in the numerator and denominator to create equivalent rational expressions.

Remember that the simplified expression MUST retain the non-permissible values of the original for both to be equivalent.

Review of Factoring:

The two methods of factoring we will need in this section are:
1) Remove a common factor
2) Completing the square

1. $2x^2 + 4x$

2. $x^2 - 16$

3. $9x^4 - 15x^3$

4. $4x^2 - 36$

$\longrightarrow$

Example 1:

Simplify each of the following and state the restrictions.

a) $\dfrac{x+3}{2x+6}$

b) $\dfrac{x-4}{x^2-16}$

Example 2: (ex.1, p. 226)

Simplify each of the following and state the restrictions.

a) $\dfrac{-24a^2}{18a^3}$

b) $\dfrac{12x^3y^2}{9x^4y}$

Example 3: (ex.2, p. 227)

Simplify each of the following and state the restrictions.

a) $\dfrac{15x^3-5x}{15x^3}$

b) $\dfrac{3x^2-12}{6x+12}$

$\longrightarrow$

Example 4:

Identify and correct the errors in the following examples.

a) $\dfrac{8x-12}{6x^2-4x}, x \neq 0, \dfrac{2}{3}$

$= \dfrac{4(2x-3)}{2x(3x-2)}$

$= \dfrac{4}{2x}(1)$

$= 2x, x \neq 0, \dfrac{2}{3}$

b) $\dfrac{x^2+1}{x^2-1}$

$= \dfrac{\cancel{x^2}+1}{\cancel{x^2}-1}$

$= \dfrac{1}{-1}$

$= -1, x \neq \pm 1$

c) $\dfrac{3}{6x}$

$= \dfrac{\cancel{3}}{\cancel{6}x}$

$= 2x, x \neq 0$

NOTE: $x+5=5+x$

however,
$$x-5 \neq 5-x$$

$$5-x=-x+5$$
$$5-x=-1(x-5)$$

Example 5:

Simplify and state the restrictions.

a) $\dfrac{2x-10}{5x-x^2}$

b) $\dfrac{2x^2-18}{12x-4x^2}$

Practice Questions:

p. 229 - 231, #2cd, 3abcd, 4ad, 5cd, 7, 13ab