

## Ch. 6 Rational Expressions & Equations

### 6.1 Rational Expressions

A rational expression is a fraction with a polynomial in the numerator & in the denominator.

ex)  $\frac{x+3}{x-5}$ ,  $\frac{1}{x^2-9}$ ,  $\frac{x^2+3x-28}{1}$

Evaluate for  $x=1, 2, 3$ .

$$\frac{x-2}{x-3} \quad x=1 \quad \frac{1-2}{1-3} = \frac{-1}{-2} = \frac{1}{2} \quad x=2 \quad \frac{2-2}{2-3} = \frac{0}{-1} = 0$$

$$x=3 \quad \frac{3-2}{3-3} = \frac{1}{0} \text{ undefined}$$

The value  $x=3$  makes the denominator 0.

So we say that  $x=3$  is a non-permissible value.  
(restrictions)

State the NPV's for:

a) $\frac{4a}{3bc}$ $b \neq 0, c \neq 0$	b) $\frac{x-1}{(x+2)(x-3)}$ $x \neq -2, +3$	c) $\frac{2y^2}{y^2-4}$ $(y-2)(y+2)$ $y \neq \pm 2$	d) $\frac{10}{2x+3}$ $2x+3 \neq 0$ $2x \neq -3$ $x \neq -\frac{3}{2}$
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e)  $\frac{4x^2-y^2}{2x-y}$       $2x-y \neq 0$   
 $2x=y$   
 $x = \frac{1}{2}y$

Equivalent Forms:

$$\frac{3m}{m+1} \left( \frac{x^m}{x^m} \right) = \frac{3m^2}{m^2+m} \left( \frac{x^2}{x^2} \right) = \frac{6m^2}{2m^2+2m} \left( \frac{(m+3)}{(m+3)} \right)$$

$$= \frac{6m^3+18m^2}{2m^3+8m^2+6m}$$

Simplify  $\frac{6m^3+18m^2}{2m^3+8m^2+6m}$

$$\frac{2m(3m^2+9m)}{2m(m^2+4m+3)}$$

$$\frac{3m(m+3)}{(m+3)(m+1)}$$

$$\frac{3m}{m+1}$$

$$m \neq 0, -3, -1$$

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#1-4 (choose a few of each)

#5-8, 15, 16, 18, 19, 21, 22, 24, 25, 30