

## Review

What values are excluded from the domain?

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

0, 4, -5

## 6.1, 6.2 Rational Functions

A rational function is of the form  $f(x) = \frac{p(x)}{q(x)}$ , where

$p$  &  $q$  are polynomials.

Simplify.      Factor First!

$$46. \frac{(3a^2 - 6a)}{(12 - 6a)} = \frac{3a(a-2)}{-6(-2+a)} = \frac{\cancel{3a}(a-2)}{\cancel{-6}(a-2)}$$

$$= \boxed{-\frac{a}{2}} = \frac{-a}{2} = \frac{a}{-2} =$$

$$a \neq 2$$

$$52. \frac{3x^3y^3 - 12x^2y^2 + 15xy}{3xy}$$

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

$$= x^2y^2 - 4xy + 5, \quad x \neq 0, y \neq 0$$

$$\begin{aligned}
 & 60. \frac{2x^2 + 7xy - 4y^2}{4x^2 - 4xy + y^2} \\
 &= \frac{2x^2 + 8xy - xy - 4y^2}{4x^2 - 2xy - 2xy + y^2} \\
 &= \frac{2x(x+4y) - y(x+4y)}{2x(2x-y) - y(2x-y)} \\
 &= \frac{(x+4y)\cancel{(2x-y)}}{\cancel{(2x-y)}(2x-y)} = \frac{x+4y}{2x-y}, \quad \begin{matrix} 2x-y \neq 0 \\ 2x \neq y \end{matrix}
 \end{aligned}$$

$$\begin{aligned}
 & 72. \frac{4a^2 - 8ab + 4b^2}{4a^2 - 4b^2} \\
 &= \frac{4(a^2 - 2ab + b^2)}{4(a^2 - b^2)} \\
 &= \frac{\cancel{4}(a-b)(a-b)}{\cancel{4}(a-b)(a+b)} \\
 &= \frac{a-b}{a+b}, \quad \begin{matrix} a+b \neq 0, a-b \neq 0 \\ a \neq -b, b \end{matrix}
 \end{aligned}$$

$a^2 - ab - ab + b^2$   
 $a(a-b) - b(a-b)$   
 $(a-b)(a-b)$   
 $(a-b)^2$

$$78. \frac{x^4 - 2x^2 - 3}{x^4 + 2x^2 + 1}$$

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

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

domain is  
all real #'s  
( $x^2+1$  is never  
zero!)

## 6.2 Operations on Rational Functions

(Same rules of fractions apply)

$$\frac{a}{b} \pm \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{d} \pm \frac{c}{d} \cdot \frac{b}{b} = \frac{ad \pm cb}{bd}$$

$$\frac{a}{b} \cdot \frac{c}{d} = \frac{ac}{bd}$$

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \cdot \frac{d}{c} = \frac{ad}{bc}$$



Hw:

6.1 # 39-79 odd

6.2 # 3-17 odd