Review

What values are excluded from the domain?

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

$x \neq 0, 4, -5$

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

$= \frac{a}{-2} = \frac{-a}{2} = -\frac{a}{2}, a \neq 2$

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

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

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

60. $\dfrac{2x^2+7xy-4y^2}{4x^2-4xy+y^2}$

$= \dfrac{2x^2+8xy-xy-4y^2}{4x^2-2xy-2xy+y^2}$

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

$= \dfrac{(x+4y)(2x-y)}{(2x-y)(2x-y)} = \dfrac{x+4y}{2x-y}$, $2x-y \neq 0$, $2x \neq y$, $x \neq y/2$

72. $\dfrac{4a^2-8ab+4b^2}{4a^2-4b^2}$

$= \dfrac{4(a^2-2ab+b^2)}{4(a^2-b^2)}$

$= \dfrac{4(a-b)(a-b)}{4(a-b)(a+b)} = \dfrac{a-b}{a+b}$, $a \neq -b, b$

$a-b \neq 0 \quad a+b \neq 0$

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

$= \dfrac{x^4+x^2-3x^2-3}{x^4+x^2+x^2+1}$

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

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

domain is all real #'s
x^2+1 is never equal to 0

6.2 Operations on Rational Functions

(Same rules of fractions apply)

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

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

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

$2x^2 \cdot -2x-3x+3$

8. $\dfrac{2x^2-5x+3}{x^6y^3} \cdot \dfrac{x^4y^4}{2x^2-x-3}$

$2x^2+2x-3x-3$

$= \dfrac{2x(x-1)-3(x-1)}{x^6y^3} \cdot \dfrac{x^4y^4}{2x(x+1)-3(x+1)}$

$= \dfrac{(x-1)(2x-3)\cdot x^4y^4}{x^6y^3(x+1)(2x-3)} = \dfrac{y(x-1)}{x^2(x+1)}, \; x \neq 0, -1, 3/2, \; y \neq 0$

$2x-3 \neq 0$

18. $\dfrac{x^4-5x^2+4}{3x^2-4x-4} \cdot \dfrac{3x^2-10x-8}{x^2-4}$

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

$3x^2-4x-4$
$3x^2-6x+2x-4$
$3x(x-2)+2(x-2)$
$(x-2)(3x+2)$

$3x^2-10x-8$
$3x^2-12x+2x-8$
$3x(x-4)+2(x-4)$
$(x-4)(3x+2)$

x^4-5x^2+4
$x^4-x^2-4x^2+4$
$x^2(x^2-1)-4(x^2-1)$
$(x^2-1)(x^2-4)$

$= \dfrac{(x-1)(x+1)(x-4)}{x-2}, \; x \neq 2, -2, -2/3$

Hw:

6.1 # 39-79 odd

6.2 # 3-17 odd