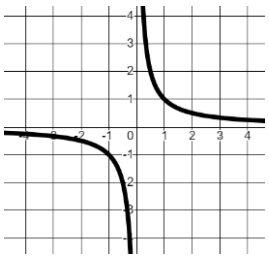
1.7 Rational Functions Notes

A rational function: $f(x) = \frac{N(x)}{D(x)}, D(x) \neq 0$

Most basic:

$f(x) = \frac{1}{x}$	

To Simplify Rational Functions:

1. Factor as much as possible.
2. Cancel common factors.

Examples:

$\frac{x^2 + 11x + 28}{2x^2 + 8x} = \frac{(x+7)(x+4)}{2x(x+4)} = \frac{x+7}{2x}$	$\frac{x^2 + 2x - 8}{x^2 - 16} = \frac{(x+4)(x-2)}{(x+4)(x-4)} = \frac{x-2}{x-4}$

Multiply/Divide Rational Functions

Multiply	Divide
1. Factor Everything 2. Cancel appropriate factors 3. Multiply straight across	1. Factor Everything 2. Cancel appropriate factors 3. Invert second fraction 4. Multiply straight across

Examples:

$\frac{x^2 + 11x + 30}{x^2 + 15x + 56} * \frac{x^2 + 4x - 32}{3x^2 + 18x} = \frac{(x+5)(x-4)}{3x(x+7)}$	$\frac{2x+1}{16x^2} \div \frac{2x^2 + 5x + 2}{4x^3 + 4x} = \frac{x^2 + 1}{4x\,(x+2)}$

Add/Subtract Rational Functions

1. Factor Denominators
2. Find a common denominator
3. Write equivalent fractions
4. Add/Subtract numerators
5. Factor and simplify numerator if possible.

Example:

$$\frac{4x}{x^2 - 2x} + \frac{3}{x^2 - 4} = \frac{4x + 11}{(x-2)(x+2)}$$

Simplify Complex Fractions

1. Write the numerator and denominator as single fractions.
2. Divide (or invert and multiply).

Examples:

$\dfrac{\frac{1}{2}+\frac{2}{x-6}}{\frac{3x-6}{x^2-12x+36}} = \dfrac{x-2}{2(x-6)} * \dfrac{x^2-12x+36}{3x-6}$	$\dfrac{\frac{x-3}{x^3}-\frac{2}{x^3-x^2}}{\frac{1}{2}-\frac{1}{x^2}}$