

X-Intercepts: Replace y with zero.

This means you are setting the ratio equal to zero and solving for x.

The only way a ratio equals zero is if the NUMERATOR equals zero.

In general, the x-intercepts of a Rational Function are the:

Zeros of the numerator (as long as they don't match zeros of the denominator, otherwise, they are holes)

A graph can have many x-intercepts.

find the x and y-intercepts of each function, if any.

$$1. \frac{\frac{(x+2)(x-2)}{x^2-4}}{(x-9)(x+2)}$$

$$y\text{-int: } y = \frac{-4}{-18} = \frac{2}{9}$$

$$x\text{-int: } x = 2$$

since -2 is a zero of both the numerator and denominator it's a Hole not an x-intercept.

$$2. \quad y = \frac{4x^2 + 12}{3x^2 - x - 24}$$

$$y\text{-int: } y = \frac{12}{-24} = -\frac{1}{2}$$

$$x\text{-int: } \text{NONE}$$

since the numerator has no real zeros ($4x^2+12$ will never equal zero if using real numbers only), there is NO x-intercept

You can now finish:

Hwk #6.

Practice Sheet: Horizontal Asymptotes and x & y-intercepts

Due tomorrow

Find all VA, HA, x-int, and y-int.

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

$$\text{HA: } y = 0$$

$$y\text{-int} = -\frac{1}{6}$$

$$x\text{-int} = -1$$

$$\text{VA: } x = -3, 2$$

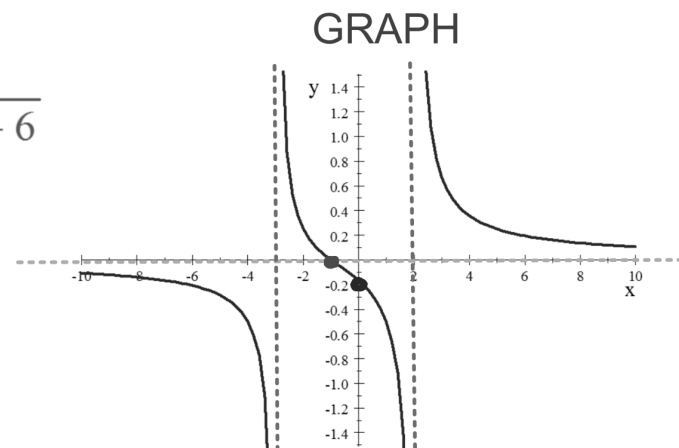
$$y = \frac{x+1}{x^2+x-6}$$

$$\text{HA: } y = 0$$

$$\text{VA: } x = -3, 2$$

$$x\text{-int: } x = -1$$

$$y\text{-int: } y = -1/6$$



Sec 9-4

Rational Expressions:

The ratio of two polynomials.

Polynomials: Have whole number exponents and real coefficients.

A rational expression is in its simplest form when:

The denominator and numerator have no common factors.

This is NOT a Rational Function, why?

$$\frac{\sqrt{x^2 - 5x + 3}}{2x - 9}$$

The numerator isn't a polynomial!

A radical represents a fractional exponent.

Sec 9-4 Simplifying Rational Expressions

- Factor all numerators and denominators
- Cancel factors common to the numerator and denominator
- Restrictions are any values that make the denominator zero at any point (beginning to end)

Simplify. State restrictions on the variable.

1. $\frac{9x^2y^8}{12x^5y^3}$

$$= \frac{3y^5}{4x^3}$$

$$\begin{matrix} x \neq 0 \\ y \neq 0 \end{matrix}$$

2. $\frac{6x^4 - 150x^2}{4x^3 - 40x^2 + 100x}$

$$= \frac{6x^2(x^2 - 25)}{4x(x^2 - 10x + 25)}$$

$$= \frac{6x^2(x+5)(x-5)}{4x(x-5)(x-5)}$$

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

$$x \neq 0, 5$$

$$\begin{matrix} 25 \\ -5 & -5 \\ -10 \end{matrix}$$

Simplify without a calculator.

$$\frac{36}{27} \cdot \frac{15}{16}$$

$$\frac{36 \div 4}{27 \div 3} \cdot \frac{15 \div 3}{16 \div 4}$$

$$\frac{9}{9} \cdot \frac{5}{4}$$

$$1 \cdot \frac{5}{4} = \frac{5}{4}$$

You can
cross
cancel
first

You can
then
simplify
 $\frac{9}{9}$

Sec 9-4 Simplifying the Product or Quotient of Rational Expressions

- Factor all numerators and denominators.
- If multiplying you can simplify within the same fraction and/or cross cancel. Finish by multiplying numerators and multiplying denominators so that you can write the answer as a single fraction.
- Instead of dividing, multiply by the reciprocal then simplify as you would when multiplying.
- State restrictions on the variable.

Simplify. State restrictions on the variables.

$$\frac{x^2 - 49}{x^2 - 9x + 14} \cdot \frac{x^2 - 2x}{4x^3 + 28x^2}$$

$$\frac{\cancel{(x+7)}(x-7)}{\cancel{(x-2)}(x-7)} \cdot \frac{\cancel{x}(x-2)}{4x^2 \cancel{(x+7)}}$$

$$\frac{1}{4x} \quad X \neq 2, \pm 7, 0$$

Handwritten notes: $\frac{-7}{-9} \frac{+14}{-2}$ (crossed out), $\frac{-4}{-3} \frac{+1}{-4}$ (crossed out)

Simplify. State restrictions on the variables.

$$\frac{x^2 - 16}{9x^2 + 18x} \div \frac{x^2 - 3x - 4}{3x^2 + 6x}$$

$$= \frac{(x+4)(x-4)}{9x(x+2)} \div \frac{(x-4)(x+1)}{3x(x+2)}$$

$$= \frac{(x+4)(x-4)}{9x(x+2)} \cdot \frac{3x(x+2)}{(x-4)(x+1)}$$

$$= \frac{x+4}{3} \cdot \frac{1}{x+1} = \frac{x+4}{3(x+1)} \quad X \neq 0, -2, 4, -1$$

Handwritten notes: $\frac{-4}{-3} \frac{+1}{-4}$ (crossed out)

Simplify. State restrictions on the variables.

$$\frac{48x^2 - 12x}{x^2 - 3x - 18} \cdot \frac{x^2 - 12x + 36}{32x^2 - 2}$$

$$\frac{12x(4x-1)}{(x-6)(x+3)} \cdot \frac{(x-6)(x-6)}{2(4x+1)(4x-1)}$$

$$= \frac{6x(x-6)}{(x+3)(4x+1)} \quad X \neq 6, -3, \pm \frac{1}{4}$$

Handwritten notes: $\frac{-18}{-3} \frac{+3}{-6}$ (crossed out), $\frac{+36}{-12} \frac{-6}{-6}$ (crossed out), $2(16x^2 - 1)$

You can now finish :

Hwk #7 Sec 9-4

Pages 511

Problems 5, 6, 10, 11, 16, 17

You are also ready for Quiz #2: Sec 9-2 to 9-4

Simplify. State restrictions on the variable.

$$\frac{x^2 + 3x - 10}{2x^2 + x - 3} \div \frac{x^3 + 5x^2 - 4x - 20}{x^2 + x - 2}$$

Simplify.

$$\frac{11}{16} + \frac{13}{24}$$