

# **Ch. 5 Rational Equations and Functions**

# 5.1 Inverse and Joint Variation

- Inverse:  $y = \frac{a}{x}$   $a$  is constant
- Joint:  $y = ax$   $a$  is constant

# 5.2 - 5.3 Graphing Rational Functions

- Rational Function:  $f(x) = \frac{p(x)}{q(x)}$
- **Type 1:**
- Hyperbola  $y = \frac{1}{x}$
- HA: x-axis;  $y = 0$
- VA: y-axis;  $x = 0$ 
  - D: All real except 0
  - R: All real except 0

- **Type 2:**

- Shifts:  $y = \frac{a}{x-h} + k$

VA: denominator,  $x = h$  (Domain)

HA:  $y = k$  (Range)

## **Intercepts:**

X-intercept: set  $y = 0$  solve for  $x$

Y-intercept: set  $x = 0$  solve for  $y$

- **Type 3:**

- $y = \frac{ax+b}{cx+d}$

VA : Denominator  $x =$

HA: The Shift OR....

degree top < degree bottom  $y = 0$

degree top = degree bottom  $y = \frac{a}{c}$

degree top > degree bottom  $y = \text{none}$

# 5.4 Multiplying and Dividing Rational Expressions

- Simplify: Factor, cancel factors
- Multiply: Factor, cross cancel factors
- Divide: multiply by reciprocal

# 5.5 Addition, Subtraction, and Complex Fractions

- Find a common denominator: factor first
- denominator must have all factors
- Simplify Answers
- **Complex:** combine top and bottom first
  - Then multiply by reciprocal
  - OR... Multiply numerator and denominator by LCD

# 5.6 Solving Rational Equations

- To solve: Multiply by LCD to eliminate fractions, then solve
- If a simple equation, cross multiply
- Check solutions



# 5.7 Analyze Graphs

- Use Graphs: increasing, decreasing, relative max and relative min.

- Determine Rate of change through each point:

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

- Even and Odd Functions:

- Even:  $f(-x) = f(x)$

- Odd:  $f(-x) = -f(x)$