Chapter 3: Powers, Roots, and Radicals

3.1 nth Roots and Rational Exponents

- Exponent Form: $a^{m/n}$

- Root Form: $\sqrt[n]{a^m}$

3.2 Properties of Rational Exponents

- **Exponent Form:** $a^{m/n}$

- When Simplifying: Use properties of Exponents
  - **Bases** must be the same
  - Don't leave fraction power in denominator

- **Root Form:** $\sqrt[n]{a^m}$

- Can Multiply and Divide with same **index**
- Can add and subtract as like terms
- To Simplify: no perfect roots and
  - no roots in denominator
- $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$
- $\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$

3.3 Power Functions and Function Operations

- Functions:
  - Can Add, Subtract, Multiply, or Divide 2 functions
  - Domain: values for x
    - Restrictions: Even Roots $\sqrt{x}$ x must be ≥ 0
    - Fractions $\frac{a}{b}$ b can never = 0

- Compositions: $f(g(x))$ and $g(f(x))$

- Putting one function into another

3.4 Inverse Functions

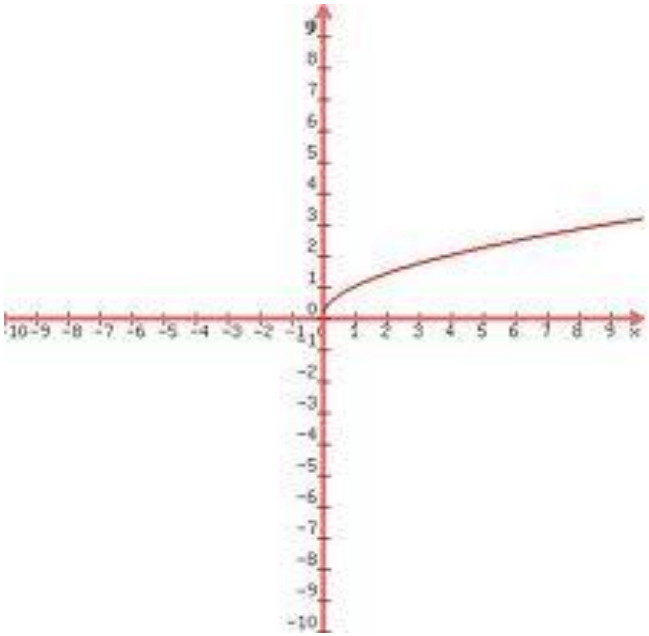
- To find Inverse:
  - switch x and y, solve for y
  - Watch for restrictions

- To determine if 2 equations are inverses:
  - $f(g(x)) = x$ AND $g(f(x)) = x$

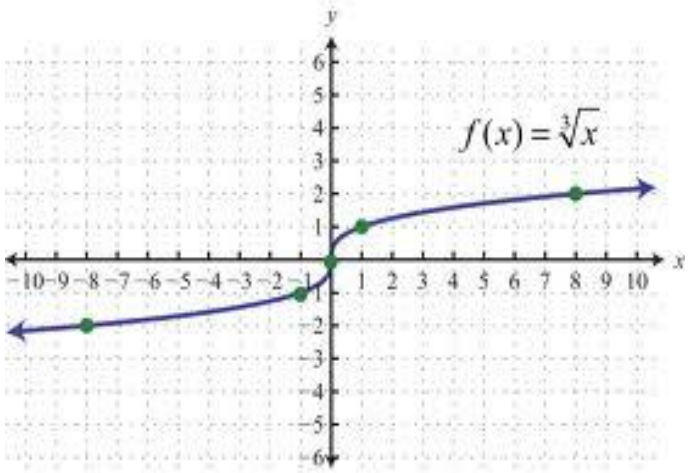
- **Graph**:
  - Equation and Inverse are reflected about y = x.
  - Sometimes Inverse of function NOT function
    - **Vertical Line Test**: determines if an equation is a function
    - **Horizontal Line Test**: determines if its **Inverse** is a function

3.5 Graphing Square Root and Cube Root Functions

- **Square Root Functions**: p. 431
  - y = $\sqrt{x}$
  - Domain: x $\geq$ 0
  - Range: y $\geq$ 0
  - Shifts: y = a $\sqrt{x - h}$ + k
  - *h* units horizontally
  - *k* units vertically



- **Cube Root Functions**:
- y = $\sqrt[3]{x}$
- Domain: all real
- Range: all real
- Shifts: y = a$\sqrt[3]{x - h}$ + k
  - *h* units horizontally
  - *k* units vertically



3.6 Solving Radical Equations

- Eliminate radicals and rational exponents
- Raise each side of the equation to the same power
- Check for extra solutions that don't work.