Functions

To be a function, the relation must assign exactly one *y* for each *x*. (For every *x* value there is exactly one *y* value)

Vertical Line Test

EX: Determine whether each equation represents *y* as a function of *x*.

- $x^2 + y^2 = 8$
- $y - 4x^2 = 36$

Notation: $f(x) = y$ Read "*f* of *x* is *y*" or "the value of *f* at *x* is *y*"

Independent and Dependent Variables:

EX: $y = x^2$

Evaluating a Function

- Let $f(x) = 10 - 3x^2$. Find the value of
  - $f(2)$
  - $f(-4)$
  - $f(x - 1)$

Piecewise-Functions:

EX: Evaluate: $f(x) = \begin{cases} x^2 + 1, x < 0 \\ x - 1, x \geq 0 \end{cases}$ at $x = -2, 2, and\ 3$

EX: Find all real values of *x* for which $f(x) = 0$, where $f(x) = x^2 - 16$

EX: Find the values of *x* for which $f(x) = g(x)$ where $f(x) = x^2 + 6x - 24$ and $g(x) = 4x - x^2$.

EX: A second baseman throws a baseball toward the first baseman 60 feet away. The path of the baseball is given by the function $f(x) = -0.004x^2 + 0.3x + 6$ where $f(x)$ is the height of the baseball (in feet) and *x* is the horizontal distance from the second baseman (in feet). The first baseman can reach 8 feet height. Can the first baseman catch the baseball without jumping?