§ 3.1 Functions

Relation: a set of ordered pairs. example:

{(4,5),(7,2),(8,11)}

Domain: - the x-values.

Function: a relation in which each element (number) in the domain corresponds to exactly one element (number) in the range. (Note: The elements in the Domain CANNOT repeat !)

Example:{(1,2),(3,4),(5,4)} IS THIS A FUNCTION ?

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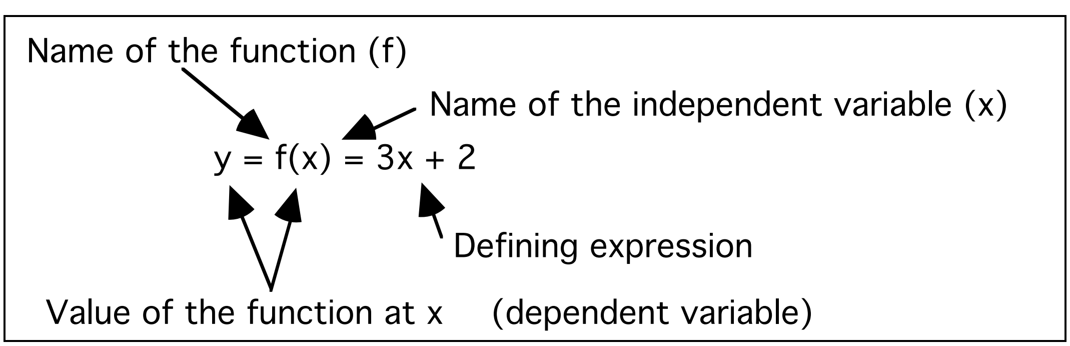
Function Notation: f(x) is read "f of x " or "the function f evaluated at x".



Independent variable: x is called the independent variable because it determines f(x), which is the y - coordinate.

Dependent variable: y is called the dependent variable because it is determined by x. (it depends on x)

Example:1 Let $g(x) = 3\sqrt{x}$, $h(x) = 1 + 4x$, $k(x) = x^2 + 3$.

Find a) $g(16)$ b) $h(3)$ c) $k(b)$

Domain & Range: (of a function)

1) If the function is in the form $y = \frac{P(x)}{Q(x)}$, solve $Q(x) = 0$. (This gives the restrictions on the value(s) of the variable (x)).

2) If the function is in the form $y = \sqrt{P(x)}$, solve the inequality $P(x) \geq 0$.

Example 2: State the Domain for each of the following:

a) $k(x) = \frac{3x}{x-5}$

b) $h(x) = x^2 + 5x$

c) $g(x) = \sqrt{x-2}$

Operations on Functions

If f and g are functions, then for all values of x for which both f(x) and g(x) exist,

the SUM of f and g is defined by:
$(f + g)(x) = f(x) + g(x)$

the DIFFERENCE of f and g is defined by:
$(f - g)(x) = f(x) - g(x)$

the PRODUCT of f and g is defined by:
$(f \bullet g)(x) = f(x) \bullet g(x)$

the QUOTIENT of f and g is defined by:
$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$, where $g(x) \neq 0$.

Example 1: Let $f(x) = 3x - 5$, and $g(x) = x + 1$
Find:

a) $(f + g)(x)$ b) $(f - g)(x)$ c) $(f \bullet g)(x)$

d) $(f/g)(x)$ e) $(f - g)(10)$.