Section 1.2 Functions

Objective: In this lesson you learned how to evaluate functions and find their domains

Important Vocabulary				
Function	**Domain**	**Range**	**Independent Variable**	**Dependent Variable**

I. Introduction to Functions

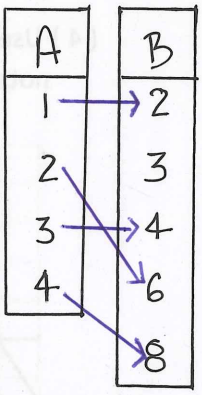
What you should learn:

How to decide whether a relation between two variables represents a function

A rule of correspondence that matches quantities from one set with items from a different set is a(n) RELATION.

In functions that can be represented by ordered pairs, the first coordinate in each ordered pair is the input (x-value) and the second coordinate is the output (y-value).

Some characteristics of a function from Set A to Set B are:



1) EACH ELEMENT of set A MUST be MATCHED WITH AN ELEMENT FROM SET B.
2) SOME ELEMENTS OF SET B MAY NOT BE MATCHED WITH ANY ELEMENT of SET A.
3) TWO OR MORE ELEMENTS of SET A MAY be MATCHED WITH THE SAME ELEMENT of SET B.
4) AN ELEMENT of SET A (DOMAIN) CANNOT BE MATCHED WITH TWO DIFFERENT ELEMENTS OF SET B.

To determine whether or not a relation is a function:

DECIDE WHETHER EACH INPUT VALUE IS MATCHED WITH EXACTLY ONE OUTPUT VALUE.

If any input value of a relation is matched with two or more output values:

THE RELATION IS NOT A FUNCTION

II. Function Notation

What you should learn:

How to use function notation and evaluate functions

The symbol f(x) is **function notation** for the value of f at x or simply f of x. The symbol $f(x)$ corresponds to the y-VALUE for a given x.

Keep in mind that f is the name of the function, whereas f(x) is the output value of the function at the input value x.

In function notation, the INPUT is the independent variable and the OUTPUT is the dependent variable.

A piecewise-defined function is:

A FUNCTION DEFINED BY TWO OR MORE EQUATIONS OVER A SPECIFIED DOMAIN

III. The Domain of a Function

What you should learn:

How to find the domains of functions

The **implied domain** of a function defined by an algebraic expression is:

THE SET OF ALL REAL NUMBERS (ℝ) FOR WHICH THE EXPRESSION IS DEFINED.

SYMBOL FOR ALL REAL NUMBERS

In general, the domain of a function excludes values that:

WOULD CAUSE DIVISION BY ZERO OR RESULT IN EVEN ROOTS OF A NEGATIVE NUMBER

IV. Difference Quotients

What you should learn:

How to evaluate difference quotients

A **difference quotient** is defined as:

$$\frac{f(x+h)-f(x)}{h},\ h \neq 0$$

USED IN LIMITS!

Describe a real-life situation which can be represented by a function.

AMOUNT OF TIME STUDYING AND CLASS GRADE.

Section 1.2 Examples – Functions

(5) Evaluate the function at each specified value of the independent variable and simplify.

$f(a) = 3a + 5$ a) $f(-2)$ b) $f(4)$ c) $f(x+1)$

a) $f(-2)$
$= 3(-2)+5$
$\boxed{= -1}$

B) $f(4)$
$= 3(4)+5$
$\boxed{= 17}$

c) $f(x+1)$
$= 3(x+1)+5$
$\boxed{= 3x+8}$

(6) Find the domain of the function.

$s(y) = \frac{3y}{y+5}$

$y+5 \neq 0$
$y \neq -5$

D: $\mathbb{R}, y \neq -5$

$\{y \mid y \in \mathbb{R}, y \neq -5\}$ ← SET BUILDER NOTATION

$(-\infty, -5) \cup (-5, +\infty)$ ← INTERVAL NOTATION

(7) Find the difference quotient and simplify your answer.

$g(x) = 3x - 1$ where $\frac{g(x+h)-g(x)}{h}, h \neq 0$ is the difference quotient

$= \frac{[3(x+h)-1]-[3x-1]}{h}$

$= \frac{3x+3h-1-3x+1}{h}$

$= \frac{3h}{h}$

$\boxed{= 3}$