𝄞1.1 Relations & Functions

Class notes and links for MCR3U Period One class

KEY TERMS

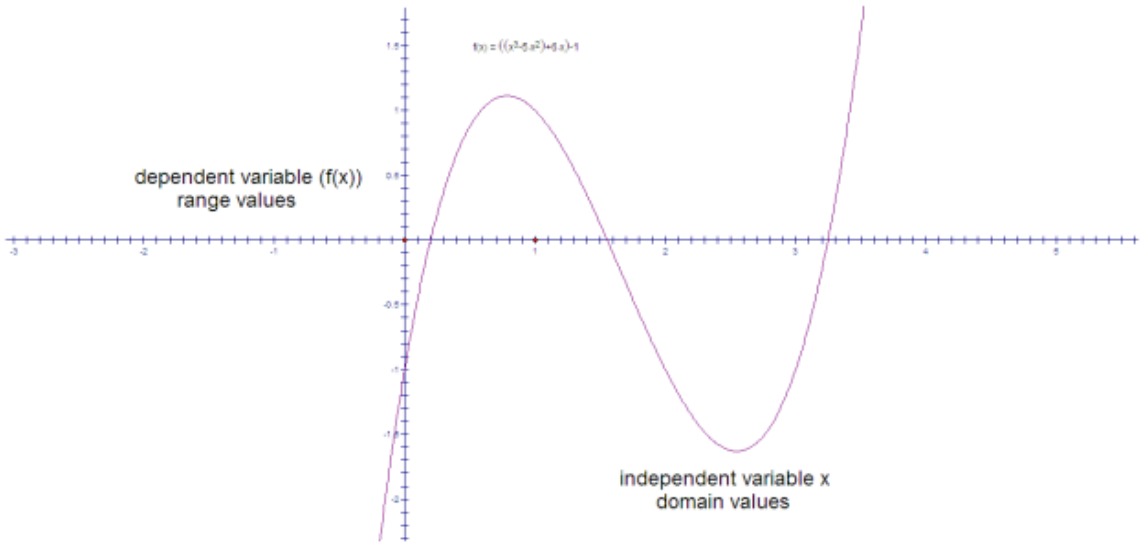
Domain: the set of all values of the independent variable of a relation (x-values)

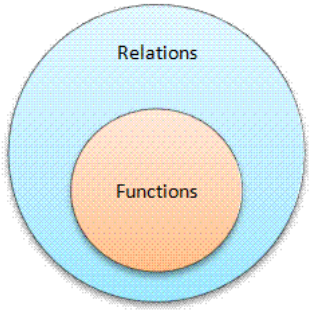
Range: the set of all values of the dependent variable of a relation (y or f(x) values)

Relation: a set of ordered pairs; values of the independent variable are paired with values of the dependent variable.

Function: a relation where each value of the independent variable corresponds with only one value of the dependent variable

Vertical Line Test: : if any vertical intersects the graph of a relation more than once, then the relation is not a function.





Class Activity Period One - I need five students to input the following data into the table below

Student Name	Age	Favourite Sport	Favourite Music Genre	Favourite Food Ethnicity

Class Activity Period Three - I need five students to input the following data into the table below

Student Name	Age	Favourite Sport	Favourite Music Genre	Favourite Food Ethnicity

Previous Semester's Results

Student Name	Age	Favourite Sport	Favourite Music Genre	Favourite Food Ethnicity
Ryley	17	Hockey	Country	Mexican
Anna	17	Volleyball	Bout anything	Vietnamese!!!
Peetah	16	Getting GAINZ	Country rap	VIET!!!
Sammi	16	Soccer	J-Pop	Chinese

This table provides us with relations. For example, we could have a column that has the following information.

Example:

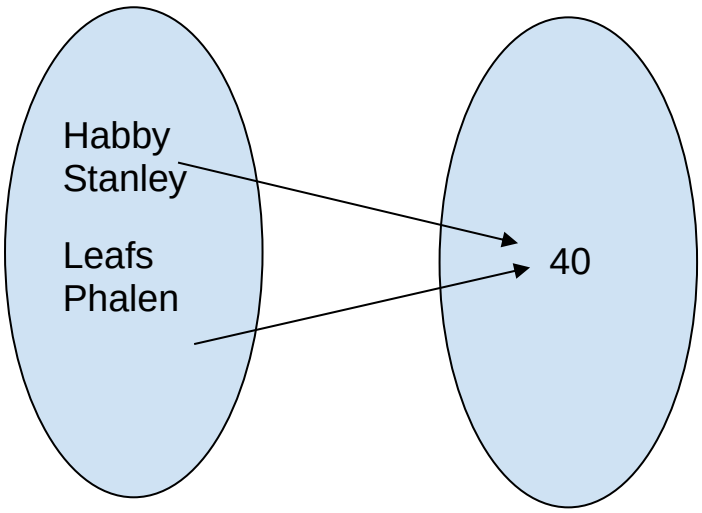
Given the data below, do we have a relationship? What is the domain and range given two relationships? Are there functions in the relationships below?

Student Name	Age	Favourite Sport	Favourite Music Genre	Favourite Food Ethnicity
Habby Stanley	40	Hockey	Contemporary	Italian
Leafs Phalen	40	Golf	Jazz	Thai

We can look at the relationship between Student Name and Age in set notation as {(Student Name, Age)} or {(Habby Stanley, 40), (Leafs Phalen, 40)}. We could look at the relationship between Age and Favourite Food Ethnicity {(40, Italian), (40, Thai)}. Note the curved brackets {}.

The domain and range in the first case {(Student Name, Age)} are:
Domain = {Habby Stanley, Leafs Phalen)} because this was the left or x-values
Range = {40} because this was the only right or y-value

In this case, we have a **function** because each x-value (Student Name in this case) is associated to a particular y-value (Age in this example). A mapping diagram is provided below where the domain is the left oval and the range is the right oval.

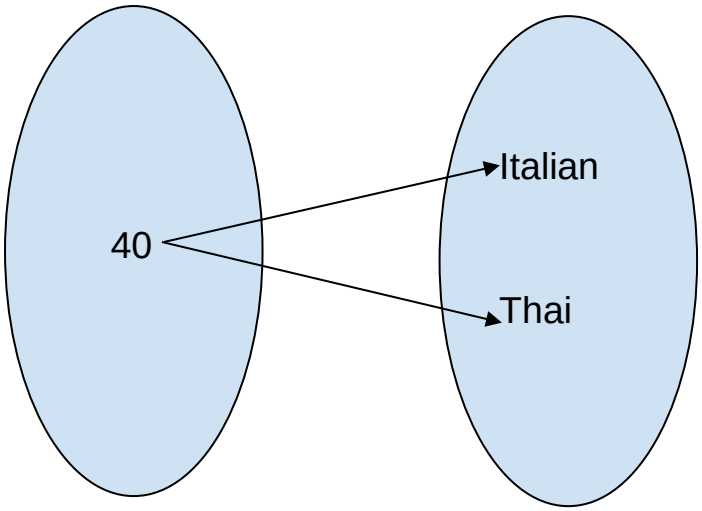


What about the other relationship between {(Age,Favourite Food Ethnicity)}?

In this case the domain and range is: {(Age, Favourite Food Ethnicity)}:

Domain = {40} because there is only one age or x-value.
Range = {(Italian, Thai)} because these are the two possible y-values

In this case, we **DO NOT** have a **function** because one of the x-values (Age) is associated with two different y-values (Favourite Food Ethnicity). Again, note the mapping diagram.



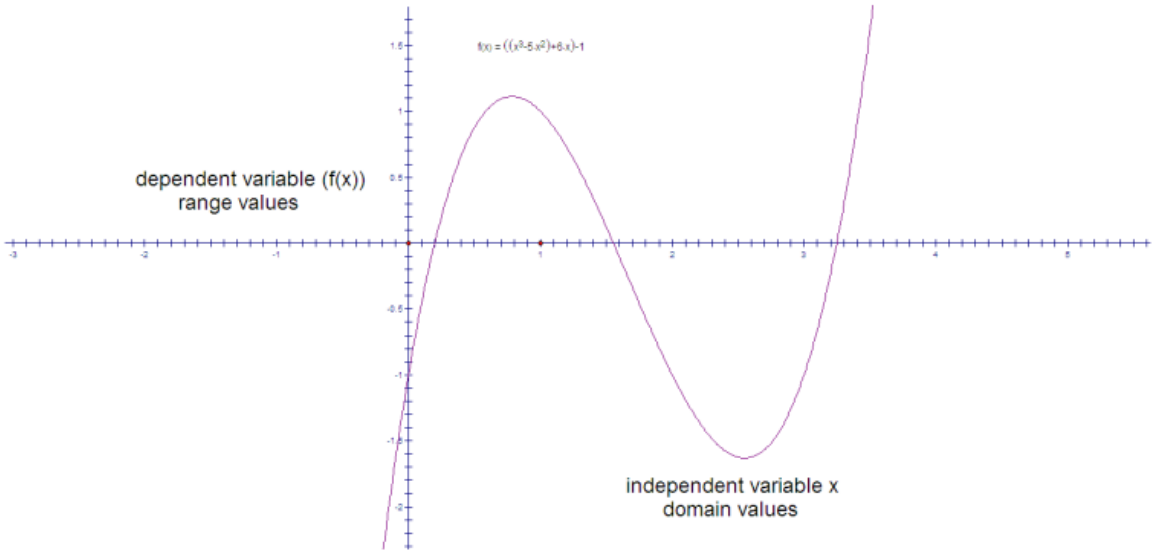
ANALOGY to understanding whether something is a function or not

Imagine that you just lost your cell phone. You decide to "ping" it using its GPS locator at a particular time (independent variable - x variable) to find its location (a distance - dependent variable - y variable). This case is a function because when the locator finds the cell phone, it can only be at **ONE** particular place at **THAT** particular time.
Careful now. A cell phone can be at the same place at two different times. This is not a contradiction. Imagine someone finding your cell phone at a coffee shop at time "a". They return to the coffee shop later in the afternoon to meet friends. Note how there were two different time (x-values) with the same location (y-value). What is not possible is for your phone to be a location "a" and "b" at the **SAME** time. If this happens, then the relation is **NOT** a function and your phone is no longer in one piece!

GRAPHING FUNCTIONS

Let us look at the following graphs and determine whether or not they are functions.

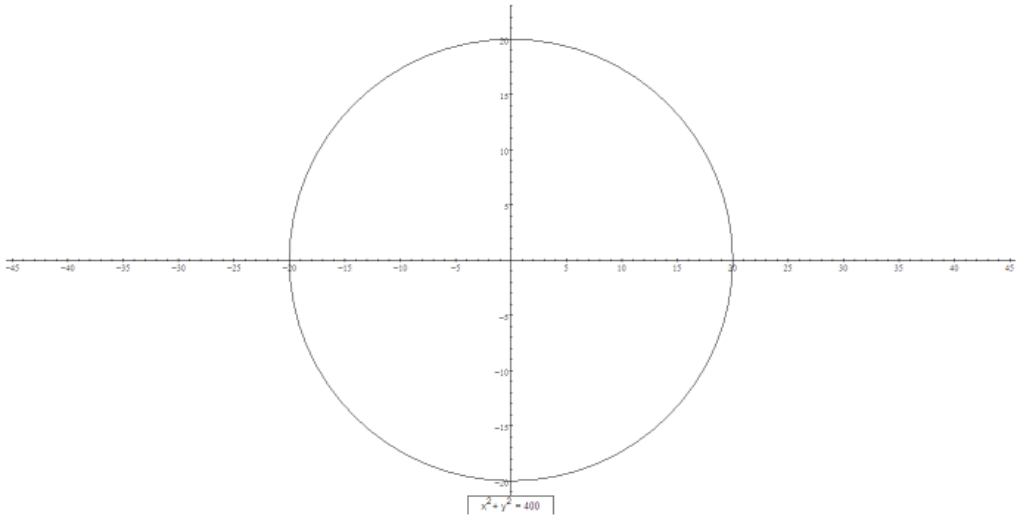
EXAMPLE ONE:



Can you find a single example where there is more than one y-value associated with the same x -value? In other words, could you draw a vertical line such that it passes through two different y-values? If you can, then this relationship will have failed the vertical line test which means that this relationship is **NOT** a function. If you **FAIL** to do so, then the relationship passes the vertical line test which means that it **IS** a function.

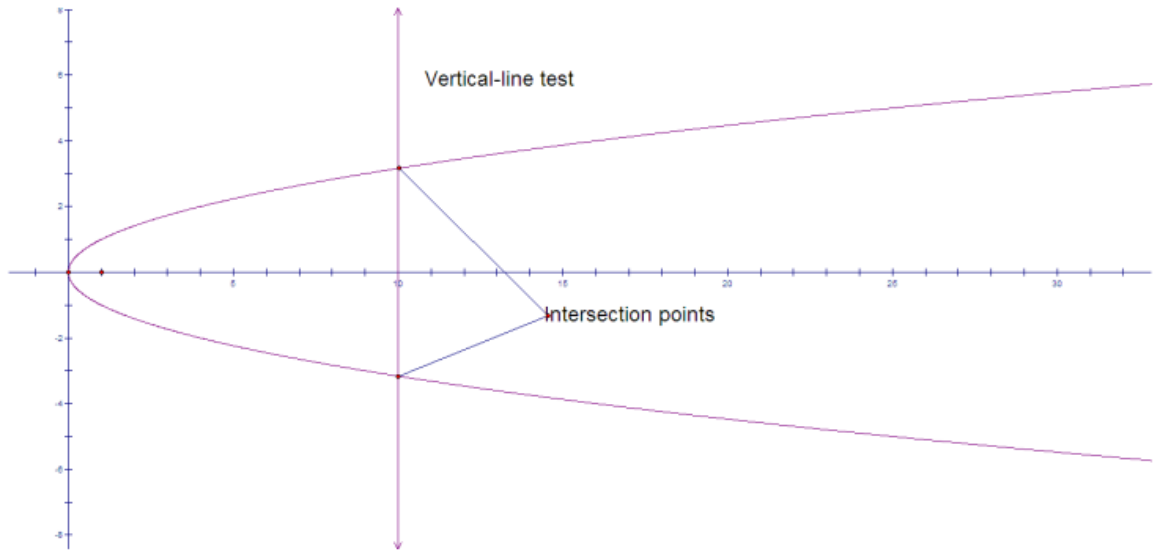
Note that in this case, this is a function as it passes any vertical line test you draw.

EXAMPLE TWO:



In this case, we can see that a line can be draw through a number of x-values such that the line will intersect with two distinct y-values.

EXAMPLE THREE:



In this case we see again that our vertical line passes through two y-values; therefore, this is not a function.

NOTE: The vertical line test should not be used where no x-value exists. This is neither a pass or failure. It simply means that the relationship does not exist at that x-value.

KEY IDEAS

A function is a relation in which each value of the independent variable corresponds with only one value of the dependent variable.

Functions can be represented in various ways: in words, a table of values, a set of ordered pairs, a mapping diagram, a graph or an equation.

HOMEWORK

𝄞1.1 Relations & Functions: 1,2,6-12,14