3.1 Relations and Functions

* A **relation** is a correspondence between two sets A and B such that each element of set A corresponds to one or more element of set B. Set A is called the domain and set B is called the range.
* A **function** is a relation such that for each element of the domain, there is exactly one corresponding element of the range.
* Instead of using the variable ***y***, letters such as ***f****,* ***g***, or ***h*** are commonly used for functions.
* The notation is called **function notation**.
* Independent Variable of a function is ***x***.
* Dependent Variable of a function is ***y***.

* Vertical-line Test: A set of points in the ***xy***-plane is the graph of a function if and only if every vertical line intersects the graph in at most one point.
* A polynomial function is a function of the form with degree .   
  \* The domain of every polynomial function is .
* A rational function is a function of the form , where .   
  \* The domain of a rational function is the set of all real numbers such that . (This means that the denominator of a rational function cannot equal zero).
* A root function is a function of the form where .  
  \* If is even, the domain is the solution to .   
  \* If is odd, the domain is the set of all real numbers for which the function is defined.

Exercises:

1. Determine whether each relation is a function and then find the domain and range.  
   a)   
    Not a function  
    Domain is   
    Range is   
   b)   
    Function  
    Domain is   
    Range is
2. ; find:  
   a)   
      
      
   b)   
      
      
   c)   
      
      
   d)   
      
      
   e)   
      
      
   f)
3. , find   
   a)   
      
      
   b)   
      
      
   c)   
      
      
   d)   
      
      
   e)   
      
      
     
     
   f)
4. Classify each function as a polynomial, rational, or root function and then find the domain: Write the domain in interval notation.  
   a)   
    Rational function  
      
   b)   
    Rational function  
      
   c)   
    Root function  
      
   d)   
    Root function