Csc\_7 Chp1 Notes

**1.1 Variables**

Variables

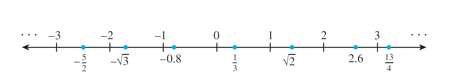
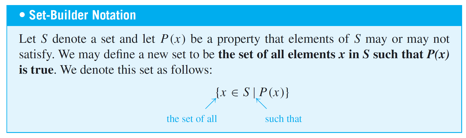
* Two ways of using it:
  + Allows one to give a temporary name to what you are seeking in a math problem.
  + Gives a temporary name to an arbitrary number that you might choose.
* Ex)
  + Q: Are there numbers with the property that the sum of their squares equals the square of their sum?
  + Rewrite: Are there numbers a and b such that a^2 + b^2 = (a+b)^2?

Mathematical Statements

* Three important kinds of statements:
  + Universal statements
    - Def) States that a certain property is true for all elements in a set
      * Ex) All positive numbers are greater than zero
      * Uses “For all…”
  + Conditional statements
    - Def) States that if one thing is true then some other thing also must be true
      * Ex) If 378 is divisible by 18, then 378 is divisible by 6
      * Uses “If-then…”
  + Existential statements
    - Def) When given a property that may or may not be true, states that there is at least one thing for which the property is true.
      * Ex) There is a prime number that is even.
      * Uses “There is…”
* Variations:
  + Universal conditional statements
    - Def) A universal and conditional statement
      * Ex) For all animals a, if a is a dog, then a is a mammal.
    - Example 2 Rewrite
      * A) is positive.
      * B) the square of x is positive
      * C) If x is a nonzero real number, then x^2 is positive
      * D) The square of any nonzero real number is positive.
  + Universal Existential Statements
    - Def) A statement that is universal because its first part says that a certain property is true for all objects of a given type, and it is existential because its second part asserts the existence of something.
      * Ex) Every real number has an additive inverse.
  + Existential Universal Statements
    - Def) A statement that is existential because its first part asserts that an object exists and is universal because its second part says that the object satisfies a certain property for all things of a certain kind.
      * Ex) There is a positive integer that is less than or equal to every positive integer.

**1.2 Language of Sets**

Set

* Def) A formal mathematical term that represents a collection of elements
  + Ex) Set of even numbers {2,4,6,8}
* Notation:
  + Given S is a set
    - 
      * Means that x is an element of S
    - 
      * Means that x is not an element of S
  + Set-roster notation:
    - Specifies a set using braces
      * Ex) 
      * Ex) {1,2,3…100}
* Axion of extension
  + Def.) States that a set is completely determined by what its elements are
    - NOT:
      * The order in which they might be listed
      * The fact that some elements might be listed more than once.
    - Meaning:
      * Set A {1,2,3} and set B{1, 2, 1, 2, 3} contain the same set of numbers
* Frequently referred numbers
  + R – set of all real numbers
  + Z – set of all integers
  + Q – set of all rational numbers, or quotients of integers
* Depiction of sets is typically pictured using points on a line.
  + 
    - 0 represents origin
* Discrete
  + Def) A set containing integers
* Set-builder notation
  + 

Subsets

* Basic relation of sets and subsets:
  + If A and B are sets, then A is called a subset of B, if and only if every element of A is also an element of B
    - Notation:
      * 

Cartesian Products

* Elements contained between parenthesis are denoted as ordered pairs
  + Ex) (a,b)
* For 2 ordered pairs to be equal, the set of pairs must be equivalent to the other ordered pair
  + Notation:
    - 
* Def) Given sets A and B, the Cartesian product is the set of all ordered pairs (a, b) where a is in A and b is in B
  + Notation:
    - 
* Cartesian Plane
  + Used to refer to a plane with the coordinate system.
    - Ex)
    - 