Csc\_7 Chp1 Notes

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.