Abstract

What follows is an informal set of lecture notes.

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Key concepts: Universal and existential quantifiers

Basic idea: For every, For each, For all - these correspond to the universal quantifier $\forall$. There is a, There are some, There exist - these correspond to the existential quantifier $\exists$

Example 1.1. Exercise 1, p. 86

A set consists of seven brown dogs, two black dogs, six gray cats, ten black cats, five blue birds, six yellow birds and one black bird. Which of the following are true?

There is an animal in the set that is red - translates to: $\exists x, x$ in the set and $x$ is red: False

Every animal in the set is a bird or a mammal - translates to: $\forall x, \text{if } x \text{ is in the set, then } x \text{ is a bird or a mammal.}$

No animal in the set is blue - translates to: $\forall x, \text{if } x \text{ is in the set, } x \text{ is NOT blue.}$ False

Example 1.2. Exercise 20. Rewrite the statement in plain English:

$\forall$ students $S$, if $S$ is in CS 321, then $S$ has taken Math 140.

Every student in CS 321 has taken Math 140.

All students in CS 321 have taken Math 140