

CSC281: Discrete Math for Computer Science

Computer Science Department
King Saud University

First Semester 1442
Tutorial 2: Valid Arguments and Proofs

Question 1. Identify the predicate functions in each of these statements, and their domains, then express each statement using quantifiers. Then form the negation of the statement, so that no negation is to the left of a quantifier. Next, express the negation in simple English. (Do not simply use the phrase It is not the case that.)

- a) Some old dogs can learn new tricks.
- b) No rabbit knows calculus.
- c) Every bird can fly.
- d) Everyone in the class knows French or Russian.

Question 2. Let $F(A)$ be the predicate A is a finite set and $S(A,B)$ be the predicate A is contained in B . Suppose the universe of discourse consists of all sets. Translate the statement into symbols.

- a) Not all sets are finite.
- b) Every subset of a finite set is finite.
- c) No infinite set is contained in a finite set.
- d) The empty set is a subset of every finite set.

Question 3. Translate each of these statements into logical expressions using predicates, quantifiers, and logical connectives.

- a) No one is prefect.
- b) Not everyone is perfect.
- c) All your friends are perfect.
- d) At least one of your friends is perfect.

Question 4. Let $P(x)$, $Q(x)$ and $R(x)$ be the statements " x is a professor," " x is ignorant," and " x is vain," respectively. Express each of the following statements using quantifiers; logical connectives; and $P(x)$, $Q(x)$ and $R(x)$, where the universe of discourse is the set of all people.

- a) No professors are ignorant.
- b) All ignorant people are vain.
- c) No professors are vain.
- d) Does (c) follow from (a) and (b)? If not, is there a correct conclusion?