FCS152 Tutorial 2
Predicates and Quantifiers

1. Rewrite each of the following statements using quantifiers:
   a. Every real number is positive, negative or zero.
   b. No logicians are lazy
   c. Some real numbers are rational
   d. Some CS students are 20 years old.
   e. Every action has an equal and opposite reaction.
   f. There is a prime number between every integer and its double.
   g. Someone trusts everyone.

2. a. Consider the universal quatified statement "$\forall x \in Z$, $1-x^2 \leq 0$". State its negation , and decide which of the two quantified statements is true.

   b. State the negation of "Every dog must have its day."

3. State the negation of each of the following statement without using negative words, give their respective logical forms and determine their truth value.

   a. There is a natural number that is even.
   b. Every natural number is even.

4. The statement “there are no easy questions on the exam” contains the words “there are”. Is the statement existential. Write the statement and its negation using quatifiers and variables.

5. The notation $\exists!$ Stands for “there exists a unique”. Suppose that P(x) is a predicate and D is the domain of x. Rewrite “$\exists!\ x \in D$ s.t. P(x)” without using the symble $\exists!$.

6. Is the following steatement true?
   $\exists\ x \in D, P(x) \wedge Q(x) \equiv (\exists\ x \in D, P(x)) \wedge (\exists\ x \in D, Q(x))$