CmpE 220 – HW #1

FULL NAME / STUDENT ID NO:

QUESTION # 1 (24) Write the following statements with variables and quantifiers and then negate them.

a) "L in $\mathbb{R}$ is the limit of the sequence S_n iff For all positive epsilon, There exists N_0 in $\mathbb{N}$, $n > N_0$ implies $|S_n - L|$ is less than epsilon"

Original :
Negation :

b) "if a natural number n is prime, then $2^n - 1$ is also an element of the set of prime numbers "

Original :
Negation :

c) "If f is an element of the set of continuous and real-valued function on [a,b] and k is some number between $f(a)$ and $f(b)$, then there exists some number $c \in [a, b]$ such that $f(c) = k$ "

Original :
Negation :

QUESTION # 2 (16) Complete the following definitions

a) To prove two sets, let's say A and B, are equal, we need to show: i) ..... and ii) .....

b) Let A be a set. The **power set of A** is the .....

c) A real number x is called **rational** if $\exists\ a, b \in \mathbb{Z}$ such that .....

d) Modus Ponens inference rule says: .....

e) To prove $p \Rightarrow q$ with **direct proof**: first ....., then reach .....

f) To prove $p \Rightarrow q$ with **contrapositive** technique: first ....., then reach .....

g) To prove $p \Rightarrow q$ with **contradiction** technique: first ....., then reach .....

h) To prove p with **contradiction** technique: first ....., then reach .....

QUESTION # 3 (30) Prove or disprove: Let A, B be two sets, $A^c \subseteq B^c \implies B \subseteq A$

(Writing "no answer" and leaving empty worth 6pts)

QUESTION # 4 (30) Prove or disprove: $\forall a, b \in \mathbb{N}^+\ \exists n \in \mathbb{N}^+$ *such that* $a \leq nb$

(Writing "no answer" and leaving empty worth 6pts)