COT 3100 Recitation #3: Exam #1 Review
9/12-9/16/2016

1) Use a truth table to evaluate the Boolean expression $(p \wedge \neg(q \wedge \neg r)) \vee (q \wedge \neg p)$.

2) Use the laws of logic to prove that the following expression

$$[p \wedge ((p \vee q) \wedge (p \vee r))] \vee [\neg p \vee (\neg p \wedge r)]$$

is a tautology.

3) Let A, B and C be three sets. Prove or disprove: $A - C \subseteq (A - B) \cup (B - C)$.

4) Let A, B and C be three sets. Prove or disprove: $A - C = (A - B) \cup (B - C)$. (Note: You may utilize your work from above in solving this question.)

5) Establish the validity of the following argument. Clearly list each step and the rule you have used.

p
$p \rightarrow t$
$t \rightarrow q$
$r \rightarrow s$
$\neg q \vee \neg s$

$\therefore \neg r$

6) Consider the following statement: $\forall x \exists y [xy = 1]$. For which of the following universes of values is the statement true: (a) positive integers, (b) positive real numbers, (c) negative real numbers, (d) non-zero real numbers, (e) real numbers? Justify your answers.