Homework Set #2
(40 points)

Name: 

Score _____/40

Work on the following problems to turn in Friday October 16. Please make sure your work is clear, neat, and organized. A reminder: You may discuss these problems with each other, but your write-up and your submission must represent your own work written independently of others.

Instructions. Recall that we have previously showed in class that modus ponens and modus tollens were valid arguments using truth tables. Consider the following four logical implications (hypothetical syllogism, disjunctive syllogism, modus ponens and modus tollens):

i. Show that these logical implications are valid arguments by building a truth table for the statement and showing it is a tautology.

ii. Choose a set of English statements for each of the variables p, q and r and then write out the specific logical implication in English as an example that each is a valid argument.

1. \((p \rightarrow q)^{(q \rightarrow r)} \rightarrow (p \rightarrow r)\)  
   Hypothetical syllogism (10 points)
2. \(((p \lor q) \land \neg p) \rightarrow q\)  

**Disjunctive syllogism (10 points)**
3. \((p \to q) \land p \to q\) \\
\text{Modus ponens (10 points)}
4. \((p \rightarrow q) \land \neg q\) \rightarrow \neg p \hspace{1cm} \text{Modus tollens (10 points)}