Math 2534:
Examples of Valid and Invalid Arguments

Problem 1:
Determine if the following arguments are valid. Explain and justify your conclusion. (You need to define all variables used. Due to time I will not define each one)

1) If Fred goes to the dance then so will Jane. Jane did go. Therefore Fred must have gone.

\[ F \rightarrow J \]
\[ J \]
\[ \therefore F \]

Not Valid since necessary condition does not guarantee sufficient condition. Converse error.

2) If it rains then the game is off. It did not rain. Therefore the game was played.

\[ R \rightarrow G \]
\[ \sim R \]
\[ \therefore G \]

Not Valid since negative sufficient condition does not imply negative necessary condition. Inverse error.

3) If you do not pass the course then you did not study. You did study. Therefore you did pass the course.

\[ \sim P \rightarrow \sim S \]
\[ S \]
\[ \therefore P \]

Valid by contrapositive.
4) If the dog barks, then the mail is here. The dog did bark, so the mail is here.

\[ D \rightarrow M \]
\[ D \]
\[ \therefore M \]

Sufficient condition is given so the necessary is guaranteed.

5) All healthy people eat an apple a day. Herbert is not healthy. Herbert does not eat an apple a day.

\[ P \rightarrow A \]
\[ \sim P(H) \]
\[ \therefore \sim A(H) \]
Not valid by Inverse error

6) All honest people pay their taxes. Jane does not pay her taxes. Jane is not honest.

\[ H \rightarrow T \]
\[ \sim T(J) \]
\[ \therefore \sim H(J) \]
Valid by Contrapositive.

7) All freshmen must take writing. Caroline takes writing, so Caroline is a freshman.

\[ F \rightarrow W \]
\[ W(C) \]
\[ \therefore F(C) \]
Not Valid by Converse error