PHIL 103: Logic and Reasoning QRII

Practice #2

1. Translate the following argument into our formal language and then use truth tables to determine whether the argument is valid or invalid.

> Katy does not go to the mall unless her friends do.
> If Katy goes to the mall, then her friends don't go.
> If Katy doesn't go to the mall, then she wishes she could.
> ___
> Katy wishes she could go to the mall.

2. If the argument in Exercise 1 is valid, then provide a formal proof of its conclusion from its premisses. If the argument in Exercise 1 is *not* valid, then provide a formal proof of the *negation* of its conclusion from its premisses.

3. Use truth tables to show that the rule of arrow introduction is valid. You may use ordinary sentence letters instead of ϕ and ψ.

4. Use truth tables to show that the following rule of inference is valid. You may use ordinary sentence letters instead of ϕ and ψ.

$$\frac{(\sim\phi \vee \psi)}{(\phi \rightarrow \psi)}$$

5. Show the following: $\{\ \} \vdash (Q \rightarrow (P \rightarrow Q))$.

6. Show the following: $\{\ \} \vdash (\sim P \rightarrow (P \rightarrow Q))$

7. Using your proofs from Exercises 5 and 6, derive the conclusion of the inference rule in Exercise 4 from its premiss. In other words, show the following: $\{ (\sim\phi \vee \psi) \} \vdash (\phi \rightarrow \psi)$. You may use ordinary sentence letters instead of ϕ and ψ.

The implications in problems 8 and 9 are instances of De Morgan's Rules for Zeroth-Order Logic. These logical relations will be of interest to us again later in the course.

8. Show the following: $\{ \sim(P \wedge Q) \} \vdash (\sim P \vee \sim Q)$.

9. Show the following: $\{ \sim(P \vee Q) \} \vdash (\sim P \wedge \sim Q)$.