Math 105: Finite Mathematics

Homework 8 : Due April 15th, 2008

April 9, 2008

Remember, show your work for full credit on all problems.

1 Natural Deduction

And Intro	**And Elim**	**Or Intro**	**Resolution**	**MP**	**MT**
P			$P \vee Q$	$P \Rightarrow Q$	$P \Rightarrow Q$
Q	$P \wedge Q$	P	$\neg P$	P	$\neg Q$
$P \wedge Q$	P	$P \vee Q$	Q	Q	$\neg P$

$$\neg\neg P = P$$
$$P \Rightarrow Q = \neg P \vee Q$$
$$\neg(P \vee Q) = \neg P \wedge \neg Q$$
$$\neg(P \wedge Q) = \neg P \vee \neg Q$$
$$P \wedge Q = Q \wedge P$$
$$P \vee Q = Q \vee P$$

You may use the inference rules of And Elimination, Or Introduction, Resolution, Modus Ponens and Modus Tolens, or the equivalence relations discussed in class. If you wish to use any other inference rules, you must provide a truth table.

1.1

Prove K is true given the following premises:

$$\begin{array}{l} D \vee K \\ (A \vee B) \Rightarrow \neg D \\ B \\ \hline K \end{array}$$

1.2

Prove $R \wedge T$ is true given the following premises:

$$\begin{array}{l} R \wedge K \\ \neg T \Rightarrow \neg P \\ B \Rightarrow P \\ C \wedge B \\ \hline R \wedge T \end{array}$$

1.3

Prove T is true given the following premises:

$$\begin{array}{l} (P \wedge Q) \Rightarrow T \\ R \Rightarrow P \\ \neg(\neg R \vee X) \\ \neg X \Rightarrow Q \\ \hline T \end{array}$$

1.4

Prove $K \Rightarrow Y$ is true given the following premises:

$$\begin{array}{l} C \vee \neg K \\ (R \vee C) \Rightarrow \neg D \\ D \\ \hline K \Rightarrow Y \end{array}$$

1.5

Prove $B \wedge \neg C$ is true given the following premises:

$$\begin{array}{l} \neg C \vee \neg K \\ Q \Rightarrow B \\ B \Rightarrow K \\ \neg Y \wedge Q \\ \hline B \wedge \neg C \end{array}$$