Math 351: Homework 1 (Due September 14)

Name: Jack Ellert-Beck

From the **0.1** exercises on pages 9, work exercises 1,2,3,5,6,7.

Problem 1

Prove the following equivalences:

a) $\neg(P \vee Q) \equiv (\neg P \wedge \neg Q)$

P	Q	$\neg P$	$\neg Q$	$P \vee Q$	$\neg(P \vee Q)$	$(\neg P \wedge \neg Q)$
T	T	F	F	T	**F**	**F**
T	F	F	T	T	**F**	**F**
F	T	T	F	T	**F**	**F**
F	F	T	T	F	**T**	**T**

b) $\neg(P \wedge Q) \equiv (\neg P \vee \neg Q)$

P	Q	$\neg P$	$\neg Q$	$P \wedge Q$	$\neg(P \wedge Q)$	$(\neg P \vee \neg Q)$
T	T	F	F	T	**F**	**F**
T	F	F	T	F	**T**	**T**
F	T	T	F	F	**T**	**T**
F	F	T	T	F	**T**	**T**

Problem 2

Prove that $P \implies Q \equiv (\neg P) \vee Q$. Deduce that the negation of $P \implies Q$ is $P \wedge (\neg Q)$.

P	Q	$\neg P$	$(\neg P) \vee Q$	$P \implies Q$
T	T	F	**T**	**T**
T	F	F	**F**	**F**
F	T	T	**T**	**T**
F	F	T	**T**	**T**