BLUE VALLEY SCHOOL

Mathematics Department	1st bimester, FS 2011
Mr. Neeman	Total points possible: 20
Quiz #4, 10A	Solutions
Topic: Logic	Estimated time: 40 minutes

Instructions: Answer all the questions, working carefully and showing your work neatly. Make sure the final answer is easily identifiable.

#1. For each of the following, circle the type of proposition it is, or "NP" if it's not a proposition. (1 pt each)

(a) The moon is made out of cheese.

Contingent

(b) Don't go anywhere.

NP

(c) Either Kansas is a state or it isn't.

Tautology

(d) Either Bill Clinton plays the saxophone or he plays clarinet.

Contingent

#2. Translate each of the following between English and logical notation, using the key given. (1 pt each)
p: Paul is a Gaul.
q: Quinn likes to drink gin.
r: Ringo owns a dingo.

(a) Either Ringo doesn't own a dingo or Quinn likes to drink gin.
$\neg r \vee q$

(b) If Paul is a Gaul, then Ringo owns a dingo.
$p \Rightarrow r$

(c) $\neg r \wedge q$
Either Ringo doesn't own a dingo, or Quinn likes to drink gin.

(d) $p \Leftrightarrow \neg p$
Paul is a gaul if and only if Paul isn't a gaul.

#2. Draw a truth table for $p \veebar (q \wedge \neg p)$ and use it to determine whether it's a tautology, a contradiction, or contingent. (4 pts)

p	q	$\neg p$	$q \wedge \neg p$	$p \veebar (q \wedge \neg p)$
T	T	F	T	F
T	F	F	F	T
F	T	T	T	T
F	F	T	T	F

So it is contingent.

#3. (a) Write down the converse of "If the moon isn't made out of cheese, then Julius Caesar was a Roman". (1 pt)
If Julius Caesar was a Roman, then the moon isn't made out of cheese.

(b) Write down the contrapositive of $(\neg p \veebar q) \Rightarrow p$. (1 pt)
$\neg p \Rightarrow \neg(\neg p \veebar q)$

#4. Use a truth table (or more than one) to determine whether the propositions $\neg(p \wedge \neg q)$ and $\neg q \Rightarrow \neg p$ are logically equivalent to each other or not. (6 pts)

p	q	$\neg q$	$p \wedge \neg q$	$\neg(p \wedge \neg q)$	$\neg q$	$\neg p$	$\neg q \Rightarrow \neg q$
T	T	F	F	T	F	F	T
T	F	T	T	F	T	F	F
F	T	F	F	T	F	T	T
F	F	T	F	T	T	T	T

They are logically equivalent, since they have the same truth values as each other on every row