Symbolic Logic Worksheet 3 Key

1. Complete the truth table below using your knowledge of symbolic logic.

p	q	~q	$p \wedge q$	$p \vee q$	$p \rightarrow q$	$q \rightarrow p$	$p \leftrightarrow q$	$p \rightarrow \sim q$	$p \vee q \rightarrow p$	$p \wedge q \rightarrow q$
T	T	F	T	T	T	T	T	F	T	T
T	F	T	F	T	F	T	F	T	T	T
F	T	F	F	T	T	F	F	T	F	T
F	F	T	F	F	T	T	T	T	T	T

Answer questions 2 through 9 based on the truth table above.

2. Which statement is a negation? ~q

3. Which statements are conditionals? $p \rightarrow q$, $q \rightarrow p$, $p \rightarrow \sim q$, $p \vee q \rightarrow p$, $p \wedge q \rightarrow q$

4. Which statement is a disjunction? $p \vee q$

5. Which statement is a biconditional? $p \leftrightarrow q$

6. Which statement is a conjunction? $p \wedge q$

7. Which statements are logically equivalent? $q \rightarrow p$ and $p \vee q \rightarrow p$

8. Which statement is a tautology? $p \wedge q \rightarrow q$

9. Determine which of the following statements are tautologies by constructing a truth table. Write yes or no in the space provided.

   a) $r \vee \sim r$ yes

   b) $r \rightarrow \sim r$ no

   c) $(x \vee y) \rightarrow (x \wedge y)$ no

   d) $\sim(p \vee q) \leftrightarrow (\sim p \wedge \sim q)$ yes

