

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

| p | q | $\sim q$ | $p \wedge q$ | $p \vee q$ | $p \rightarrow q$ | $q \rightarrow p$ | $p \leftrightarrow q$ | $p \rightarrow \sim q$ | $p \vee q \rightarrow p$ | $p \wedge q \rightarrow q$ |
|---|---|----------|--------------|------------|-------------------|-------------------|-----------------------|------------------------|--------------------------|----------------------------|
| T | T |          |              |            |                   |                   |                       |                        |                          |                            |
| T | F |          |              |            |                   |                   |                       |                        |                          |                            |
| F | T |          |              |            |                   |                   |                       |                        |                          |                            |
| F | F |          |              |            |                   |                   |                       |                        |                          |                            |

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

2. Which statement is negation? \_\_\_\_\_
3. Which statements are conditionals? \_\_\_\_\_
4. Which statement is a disjunction? \_\_\_\_\_
5. Which statement is a biconditional? \_\_\_\_\_
6. Which statement is a conjunction? \_\_\_\_\_
7. Which statements are logically equivalent? \_\_\_\_\_
8. Which statement is a tautology? \_\_\_\_\_

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

- a)  $r \vee \sim r$  \_\_\_\_\_
- b)  $r \rightarrow \sim r$  \_\_\_\_\_
- c)  $(x \vee y) \rightarrow (x \wedge y)$  \_\_\_\_\_
- d)  $\sim(p \vee q) \leftrightarrow (\sim p \wedge \sim q)$  \_\_\_\_\_