

## Worksheet 13.4: Equivalent Statements I

1. What symbol is used to represent logically equivalent?
2. What are equivalent statements?
3. Explain how you can determine whether two statements are equivalent.
4. Write De Morgan's laws for logic.
5. For a statement of the form if  $p$ , then  $q$ , symbolically indicate the form of the
  - a) converse.
  - b) inverse.
  - c) contrapositive
6. Which of the following are equivalent statements?
  - a) The converse
  - b) The contrapositive
  - c) The inverse
  - d) The conditional
7. Write a disjunctive statement that is logically equivalent to  $p \rightarrow q$ .

Use De Morgan's laws to determine whether the two statements are equivalent.

8.  $\sim(p \vee q), \sim p \wedge \sim q$

9.  $\sim p \vee \sim q, \sim(p \wedge q)$

10.  $\sim(p \wedge q), \sim p \wedge q$

11.  $\sim(p \wedge q), p \vee \sim q$

12.  $(\sim p \vee \sim q) \longrightarrow r, \sim(p \wedge q) \longrightarrow r$

13.  $\sim(\sim p \longrightarrow q), \sim p \wedge \sim q$

Use a truth table to determine whether the two statements are equivalent.

14.  $\sim p \longrightarrow q, p \wedge q$

15.  $(p \wedge q) \wedge r, p \wedge (q \wedge r)$

16.  $q \longleftrightarrow (p \wedge \sim r), q \longrightarrow (p \vee r)$

17.  $(p \longrightarrow q) \wedge (q \longrightarrow r), (p \longrightarrow q) \longrightarrow r$