

Worksheet 13.3: Truth Tables for the Conditional and Biconditional

Construct a truth table for the statement.

1. $\sim p \longrightarrow \sim p$

2. $\sim(p \longleftrightarrow q)$

3. $P \longleftrightarrow (q \vee p)$

4. $(p \vee q) \longleftrightarrow (p \wedge q)$

5. $p \longrightarrow (q \vee r)$

6. $(q \longleftrightarrow p) \wedge \sim r$

7. $(p \longrightarrow q) \longleftrightarrow (\sim q \longrightarrow \sim r)$

8. $(\sim p \longleftrightarrow \sim q) \longrightarrow (\sim q \longleftrightarrow r)$

Write a statement in symbolic form. Then construct a truth table for it.

9. If I cut the grass, then I will need to rake and I will need to bag the clippings.

10. If it rains then the roof will leak, and if the sun shines then the roof will not leak.

11. It is false that if Paige went to a movie, then she did not go to the party and she went to school.

Determine whether the statement is an implication.

12. $(p \vee q) \longrightarrow (q \wedge p)$

13. $[(p \longrightarrow q) \wedge (q \longrightarrow p)] \longrightarrow (p \longleftrightarrow q)$

If p is true, q is false, and r is true, find the truth value of the statement.

14. $\sim p \longrightarrow (q \wedge \sim r)$

15. $(r \longrightarrow \sim p) \wedge (q \longrightarrow \sim r)$

Determine the truth value for each simple statement. Then, using the truth values, determine the truth value of the compound statement.

16. A pound contains 16 ounces, if and only if a foot is equal to 15 inches or a yard is equal to 3 feet.

17. July 4 is Independence Day or two dimes have the same value as a quarter, and one dollar has the same value as 100 pennies.

Challenge: The Barr triplets have an annoying habit: Whenever a question is asked of the three of them, two tell the truth and the third lies. When I asked them which was born last, they replied as follows.

Mary: Katie was born last.

Katie: I am the youngest

Annie: Mary is the youngest

Which of the Barr triplets was born last?