

CSE311 Quiz Section 1 Answers: Apr 3, 2014

1 Introductions

2 Student Questions

3 About Implication

4 Disjunctive Normal Form

From Chapter 1.3 in the 7th ed:

- 40. Find a compound proposition involving the propositional variables p , q , and r that is true when p and q are true and r is false, but is false otherwise.

$$p \wedge q \wedge \neg r$$

- 41. Find a compound proposition involving the propositional variables p , q , and r that is true when exactly two of p , q , and r are true and false otherwise.

$$(p \wedge q \wedge \neg r) \vee (p \wedge \neg q \wedge r) \vee (\neg p \wedge q \wedge r)$$

5 Knights and Knaves

You are on an island of knights and knaves. Knights always tell the truth and knaves always lie. You encounter two people, A and B . Determine, if possible, what the two people are:

1. A says “At least one of us is a knave” and B says nothing.
A is a knight and B is a knave.
2. A says “The two of us are both knights” and B says “ A is a knave”.
A is a knave and B is a knight.
3. A says “I am a knave or B is a knight” and B says nothing.
Both are knights.
4. Both A and B say “I am a knight”.
Either one could be either thing.
5. A says “We are both knaves” and B says nothing.
A is a knave and B is a knight.

6 Translating Implication Statements

Express each of these statements in the form “if p , then q ” in English.

1. It snows whenever the wind blows from the northeast.
If the wind blows from the northeast, then it snows.
2. The apple trees will bloom if it stays warm for a week.
If it stays warm for a week, then the apple trees will bloom.

3. That the Pistons win the championship implies that they beat the Lakers.
If the Pistons win the championship, then they beat the Lakers.
4. It is necessary to walk 8 miles to get to the top of Long's Peak.
If you are on the top of Long's Peak, then you have walked 8 miles.
5. To get tenure as a professor, it is sufficient to be world-famous.
If you are world-famous, then you can get tenure as a professor.
6. If you drive more than 400 miles, you will need to buy gasoline.
If you drive more than 400 miles, then you will need to buy gasoline.
7. Your guarantee is good only if you bought your CD player less than 90 days ago.
If your guarantee is good, then you bought your CD player less than 90 days ago.
8. Jan will go swimming unless the water is too cold.

This is confusing and an example of the ambiguity of English. In everyday language this would be an "if and only if" statement, as in "Jan will go swimming if and only if the water is not too cold". The textbook translation of unless is "if not". In that spirit the sentence becomes "If the water is not too cold, then Jan will go swimming".