
CS 131 – SPRING 2017 – LAB 1

Question 1 How would you write each of these propositions using combinations of e , meaning “Sue is an English major,” and j , meaning “Sue is a junior” with the operations \wedge, \vee, \neg , and \rightarrow ?

- (a) Sue is a junior English major.
- (b) Sue is either an English major or she is a junior.
- (c) Sue is a junior, but she is not an English major.
- (d) Sue is neither an English major nor a junior.
- (e) Sue is exactly one of the following: an English major or a junior.
- (f) Sue is a junior only if Sue is not an English major.

Question 2 Determine whether each of these conditional statements is true or false.

- (a) If $1 + 1 = 2$, then $2 + 2 = 5$.
- (b) If $1 + 1 = 3$, then $2 + 2 = 4$.
- (c) If $1 + 1 = 3$, then $2 + 2 = 5$.
- (d) If monkeys can fly, then $1 + 1 = 3$.

Question 3 Use a truth table to establish the following logical equivalences.

- (a) $\neg(\neg p \vee q) \equiv p \wedge \neg q$
- (b) $p \wedge (p \vee q) \equiv p$
- (c) $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$

Question 4 You meet two inhabitants of Smullyan’s Island. A says, “Exactly one of us is lying,” and B says, “At least one of us is telling the truth.” Who (if anyone) is telling the truth?

Question 5 State the converse, contrapositive, and inverse of each of these conditional statements.

- (a) If it snows today, I will ski tomorrow.
- (b) I come to class whenever there is going to be a quiz.
- (c) A positive integer is a prime only if it has no divisors other than 1 and itself.