

CSC165 Tutorial #3

Winter 2015

Work on these exercises *before* the tutorial. You don't have to come up with complete solutions before the tutorial, but you should be prepared to discuss them with your TA.

Proving Equivalence

1. Prove that $P \implies (Q \implies (R \implies S))$ is equivalent to $(P \wedge Q \wedge R) \implies S$.

2. Prove that $((P \implies Q) \implies R) \implies S$ is equivalent to $(\neg P \wedge \neg R) \vee (Q \wedge \neg R) \vee S$.

Negation

1. Every dog has its day, or perhaps its cat.

2. $\forall x \in X, \exists y \in Y, x > y \wedge y > x$

Guarantees

Consider the statement:

(S1) A and B are both guarantees that C is true.

1. Write (S1) symbolically. Use parentheses “(” and “)” to make your answer precise.
2. Choose some appropriate phrases to replace A, B and C. Use these to write (S1) in English. Does this cause you to reconsider your answer to (1)?
3. Suppose (S1) is true and A is false. What, if anything, can be determined about B and C? Briefly justify.
4. Suppose (S1) is true and C is false. What, if anything, can be determined about A and B? Briefly justify.