

FCS152 Tutorial 1

Propositional logic

1. Decide which of the following sentences are propositions:
 - i) 2 is the smallest prime number.
 - ii) She is a Curtin student.
 - iii) $x=245$.
 - iv) 1M bytes = 1000 Kbytes.
2. Logic Proofs:
 - i) Prove that $a \rightarrow b$ is equivalent to $\neg b \rightarrow \neg a$ using a truth table.
 - ii) Prove it using equivalence rule.
3. Prove or disprove the following equalities about the XOR operator
 - i) $a \oplus (b \oplus c) = (a \oplus b) \oplus c$
 - ii) $a \oplus (b \oplus c) = (a \oplus b) \oplus (a \oplus c)$
4. Decide the contrapositive, converse and inverse of the following statements. Discuss whether and how they are different from the original statement.
 - i) If you can do all tutorial questions correctly, you'll pass the exam.
 - ii) If you are rich and healthy, you are happy.
5. In the restroom of a fancy Italian restaurant, there is a sign that reads: *Please do not leave valuables or laptop computers in your car.*
Assuming that a laptop computer is considered a valuable, prove using formal logic, that the sentence *Please do not leave valuables in your car* is equivalent to the sign in the restroom. Prove that *Please do not leave laptops in your car* is not equivalent.