Homework – 02

Topic(s)   De Morgan's Law + Implication

1. Use De Morgan's law to write *negation* of following sentences in *intelligible* English.

   a) The food is expensive but not healthy.

   b) Object Oriented Programming is interesting but difficult.

   c) If you waste your time, time will waste you.

   d) If you have A in the programming then you can choose this course.

   e) The question paper was hard or you were not well prepared.

   f) If the food is expensive then it's healthy.

   g) A recursive function uses more memory and time.

2. Develop truth tables for each of the following. [Operators' Precedence (from highest to lowest): ¬, ∧, ∨, →]

   a) $p \lor (\neg p \land q) \to q$

   b) $p \lor (\neg p \land q) \to \neg q$

   c) $(p \to q) \to (q \to p)$

   d) $(p \oplus q) \to (p \oplus \neg q)$

   e) $(p \to \neg q) \to (q \to \neg p)$

3. Let p, q, r denote the propositions: p: ΔABC is isosceles, q: ΔABC is equilateral and r: ΔABC is equiangular. Translate each of the following into intelligible English.

   a) $q \to p$
   b) $\neg p \to \neg q$
   c) $p \land \neg q$
   d) $r \to p$

4. Write down the converse and the contrapositive of the following propositions.

   a) If the input file exists, then an error message is not generated.

   b) If the database is not accessible, then my program cannot run.

   c) If my program contains no bugs, then it produces correct output.

   d) If the file is not damaged and the processor is fast, then the printer is slow.

   e) A square is a four sided figure.

   f) If ΔBAC is right triangle, then $a^2 = b^2 + c^2$

   g) If $0 + 0 = 0$, then $1 + 1 = 1$.

5. Is it possible for both an implication and its converse to be false? Explain your answer.

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