Homework 2:

Problem 1: Using both, the Truth Tables method and the Wang’s algorithm show (must include every step) whether the following sentences are valid, satisfiable, or unsatisfiable:

1. ((P 🡪 Q) & (Q 🡪 R)) 🡪 (P 🡪R)
2. P 🡪 ¬ P
3. (P V Q) & (¬ P V ¬ Q)
4. (P 🡪 Q) & (Q 🡪 ¬ P)
5. P 🡪 (¬ P 🡪 P)
6. P V Q V ¬ Q
7. P V Q V (P 🡪Q)
8. (P & Q) V ¬ Q

Problem 2: Consider a vocabulary with only 4 propositions: A, B, C, and D. How many models are there for the following sentence?

(A 🡪 B) & A & ¬ B & C & D

Problem 3:

Jones, Smith and Clark hold the jobs of programmer, knowledge engineer, and manager (not necessarily in this order). Jones owes the programmer $10. The manager spouse prohibits borrowing money. Smith is not married. Define each person's job using propositional logic.

Hint: You must first represent facts as propositions, and then use the rules of PL to infer the solution which states who is the programmer, who is the KE and who is the manager.

Use the following vocabulary:

JP (Jones is a programmer)

JK (Jones is a KE)

JM (Jones is a manager)

and respectively SP, SM, SK, CP, CM, CK.

Note that each person may have only one job, i.e. for Jones we have JP v JK v JM Similar facts must be stated for Smith and Clark (SP v SK v SM, CP v CK v CM)

Note also, that each job can be taken by just one person which results in the following statements: JP v SP v CP, JM v SM v CM, JK v SK v CK.

Represent the rest of the facts contained in the problem definition is a similar way. For example, the fact "Jones owes the programmer $10" suggests that Jones is not a programmer, that is ¬ JP.

Must show the entire proof step by step (premises, rule applied, conclusion).

Verify your answer using Wang's algorithm (by hand or using the program from my web site).