Homework Prop Logic – Inference

1. Consider the statement "The car is either at John's house or at Fred's house. If the car is not at John's house then it must be at Fred's house".
Describe a set of propositional letters which can be used to represent this statement.
Describe the statement using propositional formula on the propositions you described for (a).
Can you determine where the car is?

2. Exercise 7.4 (a-g) , 7.5, 7.10 (a-d), 7.17, 7.20 (except DPLL trace) from book.

3. Convert the following propositional calculus sentence into clauses:

$$\neg[((P \vee \neg Q) \to R) \to (P \wedge R)]$$

4. Use Resolution Algorithm to solve the following problem
Given:
B ∧ C → A
B
D ∧ E → C
E ∨ F
D ∧ ¬F
Query :
A
Can we entail the query from the knowledge base?

5. Use Forward Chaining to solve the following problem:
Given:
A
B
C
A ∧ B → D
B ∧ D → F
F → G
A ∧ E → H
A ∧ C → E
Is H true? Draw a tree to illustrate the search for a proof.

8. Use Backward Chaining on the following KB to prove Q:
P → Q
E → B
R → Q
M ∧ N → Q

A ∧ B → P
A → M
C → M
D → N
D
A

Draw a tree to illustrate the search for a proof. Mark the nodes that are satisfied in this KB. What is the proof of Q? (write explicitly a sequence of steps to obtain Q)