Assignment No: 2

1. Consider the following axioms:

(1) Marcus was a man.

(2) Marcus was a Pompeian.

(3) All Pompeians were Romans.

(4) Caesar was a ruler.

(5) All Romans were either loyal to Caesar or hated him.

(6) Everyone is loyal to someone.

(7) People only try to assassinate rulers they are not loyal to.

(8) Marcus tried to assassinate Caesar.

**Using resolution find whether Was Marcus loyal to Caesar?**

**Using resolution Prove that Marcus Does Not Hate Caesar**

2. Consider the following axioms:

1. Anyone whom Mary loves is a football star.
2. Any student who does not pass does not play.
3. John is a student.
4. Any student who does not study does not pass.
5. Anyone who does not play is not a football star.
6. (Conclusion) If John does not study, then Mary does not love John.

**Using resolution Prove the inference drawn from the facts**

*Hint: FOL for Statement 6: ¬ STUDY(John) → ¬ LOVES(Mary,John)*

*After Negating the conclusion, which results into : STUDY(John) ^ LOVES(Mary, John)*

*Take second statement to prove with resolution i.e. LOVES (Mary, John)*

3. Consider the following axioms:

1. Anyone who rides any Harley is a rough character.
2. Every biker rides [something that is] either a Harley or a BMW.
3. Anyone who rides any BMW is a yuppie.
4. Every yuppie is a lawyer.
5. Any nice girl does not date anyone who is a rough character.
6. Mary is a nice girl, and John is a biker.
7. (Conclusion) If John is not a lawyer, then Mary does not date John.  
   *¬ LAWYER(John) → ¬ DATE(Mary,John)*

***Prove the conclusion using resolution***

4. Consider the following axioms:

1. Every child loves Santa.
2. Everyone who loves Santa loves any reindeer.
3. Rudolph is a reindeer, and Rudolph has a red nose.
4. Anything which has a red nose is weird or is a clown.
5. No reindeer is a clown.
6. Scrooge does not love anything which is weird.
7. (Conclusion) Scrooge is not a child.

Using Resolution prove that inference drawn from facts is true

5.  Consider the following axioms:

1. All dogs are animal.

2. Fido is a dog.

3. All animals will die.

Using Resolution Prove Fido will die!

1. Consider the following axioms:

1. Anyone passing his history exams and winning the lottery is happy.

2. Anyone who studies or is lucky can pass all his exams.

3. John did not study but he is lucky.

4. Anyone who is lucky wins the lottery.

Using Resolution Prove that John is happy!

7. Consider two medical tests, A and B, for a virus. Test A is 95% effective at recognizing the virus when it is present, but has a 10% false positive rate (indicating that the virus is present, when it is not). Test B is 90% effective at recognizing the virus, but has a 5% false positive rate. The two tests use independent methods of identifying the virus. The virus is carried by 1% of all people. Say that a person is tested for the virus using only one of the tests, and that test comes back positive for carrying the virus. Which test returning positive is more indicative of someone really carrying the virus? Justify your answer mathematically.