Problem Set 1

1. Convert the following sentences into predicate calculas:

a. If it does not rain on Monday, Ram will go to the mountains
b. Cute is a good cat.
c. All basketball players are tall.
d. Some people like anchovies.
e. If wishes are horses, beggars would ride.
f. Nobody likes Delhi.

2. Attempt to unify the following pairs of expressions either with their most general unifiers or explain why they will not unify:

a. p(X,Y) and p(a,Z)
b. p(X,X) and p(a,b)
c. Ancestor(X,Y) and Ancestor(x,Father(x))
d. Ancestor(X,Father(X)) and Ancestor(Ram,Sita)
e. q(X) and ¬q(a)

3. Transform each of the following sentences into disjunctive normal form:

a. $\neg(P \wedge Q) \wedge (P \vee Q)$
b. $\neg(P \vee \neg Q) \wedge (R \rightarrow S)$
c. $P \rightarrow ((Q \wedge R) \leftrightarrow S)$

4. Consider the following sentences:

i. Ram likes all kinds of vegetarian food.
ii. Oranges are food.
iii. Mutton is food.
iv. Anything anyone eats and not killed by is food
v. Likex eats peanuts and is still alive
vi. Loves eats everything Likex eats.

a. Translate these sentences into formulas in predicate logic
b. Prove that Ram likes peanuts using backward chaining
c. Convert the formulas of part (a) into clauses
d. Prove that Ram likes peanuts using resolution