Practice Before Midterm
(Single Sample Question)

1. In a remote town in Africa there are two taxi companies, the Green Taxi Co (has only green taxi) and the Blue Taxi Co (has only blue taxi). 10% of the taxis on the road are blue and the rest (90%) are green. There was an accident on a dark evening, and the witness claimed a Blue cab was involved. On further testing, they discovered that under the conditions of that evening, there was an 80% chance of correct identification of the cab color (regardless of color) and 20% chance of erring in color identification. (assume neither company is more accident prone than the other)

   a. Before actually hearing the testimony of this witness, what is the probability that the witness will claim that it was a Blue Cab involved in the accident that night? (Hint: Prior probability of Blue cab involved in accident)

   b. What is the likelihood that Green taxi involved in the accident given the observation?

   a. Let P(accBlue) be the prior probability that the blue cab involved in the accident.

   P(accBlue) = P(accBlue|obsBlue).P(obsBlue) + P(accBlue|~ obsBlue). P(~obsBlue)
   =0.8 x 0.1 +0.2 x 0.9 = 0.26

b. p(Green|obsBlue) = P(obsBlue|Green)xP(Green)/P(obsBlue) = 0.2x0.9/P(obsBlue) = 0.18/P(obsBlue) --(1)

   p(Blue|obsBlue) = P(obsBlue|Blue)xP(Blue)/P(obsBlue) = 0.8x0.1/P(obsBlue)=0.08/P(obsBlue) – (2)

The ration between 1 and 2 gives the likelihood that Green taxi involved in the accident given that observation

p(Green|obsBlue)/P(Blue/obsBlue) = 0.18/0.08 = 2.25

2. Other materials you are expected to know include but not limited to the followings:
   a. Create ROC curve and compare performance of machine learning algorithms.
   b. Given a set of interpretation and Predicate constants one should be able to convert them into statements of first order or propositional logic.
   c. Limitations of propositional and first order logic
   d. Informed search, heuristic evaluation functions
   e. Basic definition of precession and recall etc.