# AI Assignment Questions

1. You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug?" Write down all possible production rules and find two possible solutions.

2. Solve one example for each of the following:
   a. Bread-frist search
   b. Depth-first search
   c. Local beam search
   d. Best first search
   e. A* algorithm
   f. AO* Algorithm

3. Solve following CSP problems using crypt-arithmetic.

   B A S E + B A L L = G A M E S

   D O N A L D + G E R A L D = R O B E R T

4. Use first order logic to generate knowledge base:
   a. All hounds howl at night.
   b. Anyone who has any cats will not have any mice.
   c. Light sleepers do not have anything which howls at night.
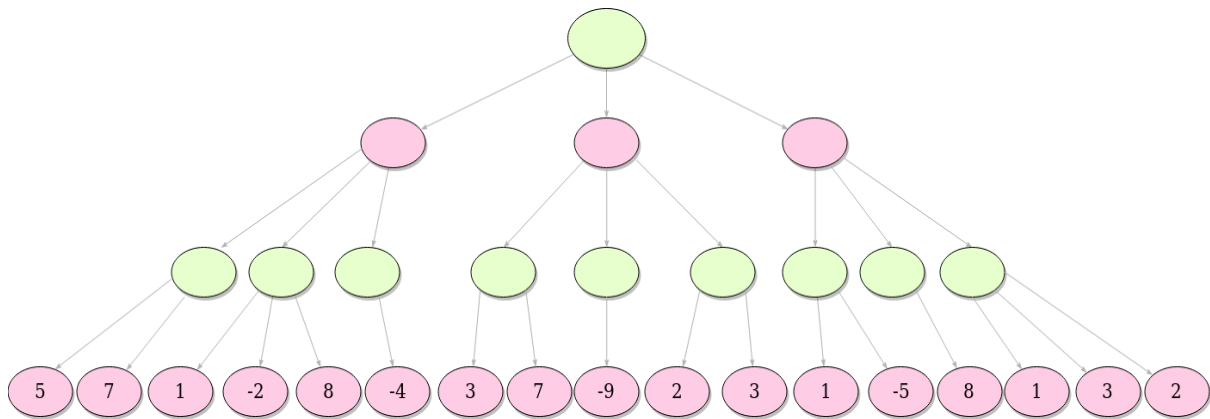   d. John has either a cat or a hound.

   Prove by resolution

      If John is a light sleeper, then John does not have any mice.

5. Use first order logic to generate knowledge base:
   a. It is a crime for an American to sell weapons to hostile nations.
   b. Nono has some missiles
   c. All of the missiles were sold to country Nono by Colonel West.
   d. Missiles are weapons
   e. Enemy of America counts as "hostile".
   f. West is American.
   g. Nono is an enemy of America

   Prove by resolution

      West is a criminal.

6. Solve following minimax problem using alpha-beta pruning.

5  7  1  -2  8  -4  3  7  -9  2  3  1  -5  8  1  3  2

7. Translate following English Sentences into First-Order Logic

   a. All students are smart.
   b. There exists a student.
   c. There exists a smart student.
   d. Every student likes some student.
   e. Every student likes some other student.
   f. There is a student who is liked by every other student.
   g. Bill is a student.
   h. Bill takes either Analysis or Geometry (but not both)
   i. Bill takes Analysis or Geometry (or both).
   j. Bill takes Analysis and Geometry.
   k. Bill does not take Analysis.
   l. No student loves Bill.
   m. Bill has at least one brother.
   n. Bill has no sister.
   o. Bill has at most one brother.
   p. Bill has exactly one brother.
   q. Bill has at least two brother.
   r. Every student takes at least one course.
   s. Only one student failed History.
   t. No student failed Chemistry but at least one student failed History.
   u. Every student who takes Analysis also takes Geometry.
   v. No student can fool all the other students.