CIS 716 Homework 4

1. Consider the state space for the eight puzzle as given in Figure 1 at the end of this homework. If the function $c(n_i, n_j)$ gives the value 1 for all pairs of nodes, explain how reinforcement learning can be used to learn the heuristic values of the nodes in Figure 1.

   As part of your answer, you should compute the estimated heuristic value of all the numbered nodes in Figure 1 and explain how you obtain those values. You should do this computation for three complete iterations (in other words do three complete searches, updating the heuristic values every time).

   (50 points)

2. The following table gives some examples of recent book selections I have made on the Orinoco website (Orinoco is the world's least well known online bookstore).

   | | Attributes | | | | | Will Buy |
Examples	New	Paper	Know	Lang	Type	
X_1	N	N	Y	Eng	Thriller	Y
X_2	N	N	Y	Sp	Romance	N
X_3	Y	N	N	Eng	Detective	Y
X_4	N	Y	Y	Sp	Romance	Y
X_5	N	Y	N	Sp	Thriller	N
X_6	Y	N	Y	Eng	Literature	Y
X_7	Y	N	N	Fr	Detective	N
X_8	N	N	Y	Eng	Romance	Y
X_9	Y	Y	N	Sp	Detective	N
X_{10}	Y	Y	Y	Sp	Literature	N
X_{11}	N	N	N	Fr	Romance	N
X_{12}	Y	Y	Y	Sp	Detective	Y

   This records whether or not the book is *New*ly published, is a *Pa*-*per*back or not, whether I *Know* the author (that is whether I have previously bought a book by the same author), what *Lang*uage the book was orginally written in (English, French or Spanish), and what genre the book is from (Thriller, Romance, Dectective, or Literature). The site also records whether or not I actually bought the book (or just browsed it).

Use the decision tree learning algorithm from the notes to consruct a decision tree that Orinoco could use to predict whether I am likely to want to purchase any new books that they start to stock.

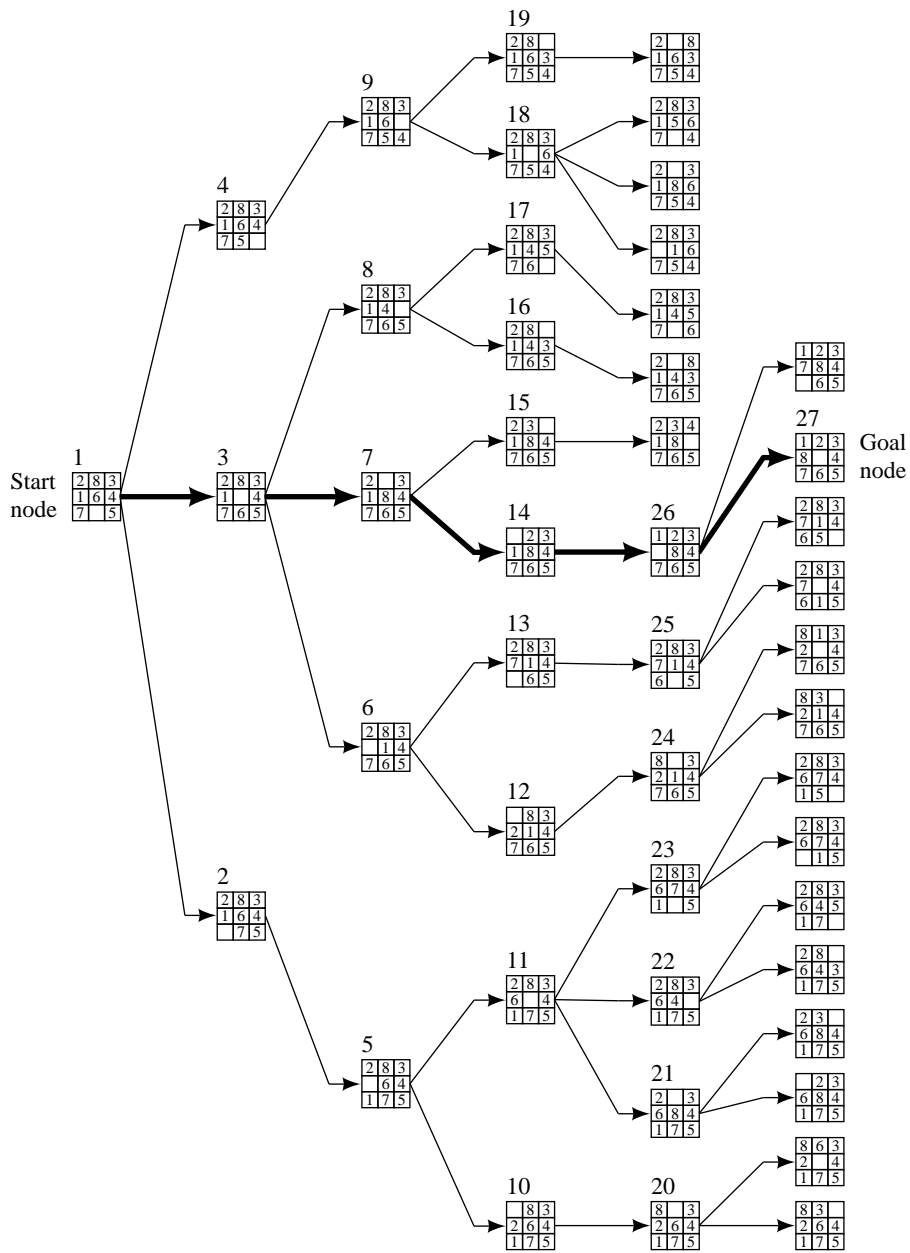As ever, you should explain how the algorithm builds the decision tree, not just give the solution.

(50 points)

Figure 1: Search space for the eight puzzle