AI Assignment 1

Q1) part c:

1. Why is it important to have an admissible heuristic in A\* to ensure optimality?

It is significant to ensure that you use an admissible heuristic in order to reach the best solution of the problem as it never leads to overestimating the cost of reaching the goal state. If we use heuristic that is not admissible it is possible that our actual best path gets the overestimated and higher value. For this reason, the algorithm will not chose the shortest/leastcost path but rather any other path which seem to be of least cost and will reach to the goal with this path which is actually not the cheapest. Hence, it is important to ensure that the heuristic for A\* lies in 0 <= h(n) <= h\*(n).

h\*(n) is the true cost of the shortest path.

1. In addition to admissibility, A\* also requires monotonicity in graph based problems. You are required to do some readings to understand monotonicity requirement of A\*. Describe it in your own words.

In order for A\* to give an optimal solution, it has to be both monotonic and admissible. We saw the importance of admissibility in the previous part but the requirement was making sure that the entire cost of reaching the goal is not overestimated. Monotonicity of A\* whereas ensures that the cost between 2 nodes is not overestimated and the order is preserved throughout the consecutive states. It states that;

1. for all states ni and nj, where nj is a descendant of ni, h(ni) - h(nj) <= cost(ni,nj).
2. h(goal) = 0

this property also ensures the admissibility of the search.

source: <http://www.cs.trincoll.edu/~ram/cpsc352/notes/astar.html>