Assignment

Note: Attempt as many as you can. All exercises have equal weight. The last date for submission of the code and brief report is 3rd April, 11:55 PM (Friday). The report should include the problem definition, algorithm, results, comments and plots.

Exercise 1. Consider the 15-puzzle problem with Manhattan distance heuristic function. The goal state is given below:

	1	2	3
4	5	6	7
8	9	10	11
12	13	14	15

Apply A* and IDA* algorithms to the given problem with 20 randomly generated initial states and comment and compare their results. Tabulate the results as shown below and plot the same.

Number	Initial State	Length of Optimal Solution		Number of nodes generated	
		A*	IDA*	A*	IDA*
1.					
…	…	…	…	…	…
20.					

Exercise 2. Consider the 15-puzzle problem with Manhattan distance heuristic function. The goal state is given below:

	1	2	3
4	5	6	7
8	9	10	11
12	13	14	15

Apply IDA* and RBFS algorithms to the given problem with 20 randomly generated initial states and comment and compare their results. Tabulate the results as shown below.

Bonus points: apply the same algorithms with weighted heuristic function such that the cost function is non-monotonic and see how bad the solutions are.

Exercise 3. Generate at least 20 instances of 8-queens and solve them using random restart hill-climbing and simulated annealing. Measure the percentage of solved problems and plot. Comment on your results.

Exercise 4. Solve 8-queens problem using genetic algorithm with single point cross over, roulette wheel selection and very small mutation probability. Comment and compare your results for various instances of initial population.

Exercise 5. Construct a game playing agent using alpha-beta pruning for tic-tac-toe game. Assume your own move generators and evaluation function. What is the effective branching factor? Can you improve this by improving the move ordering? Comment on your results.
