COMP3702/7702 ARTIFICIAL INTELLIGENCE
Semester 2 2013
Quiz 1 – Thursday, 5 September 2013
Time: 20 minutes

Student ID:
Name:

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1. Suppose we are given a simplified map as shown in Fig. 1.

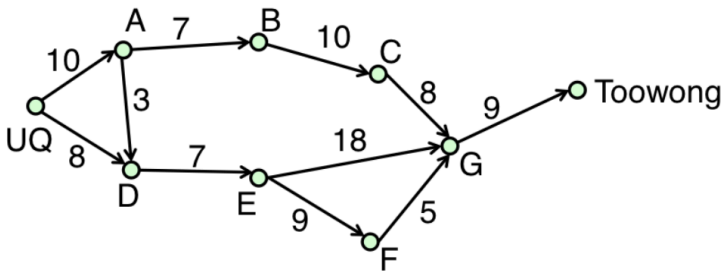

Fig. 1. The labels on the edges represent the cost of moving.

Please write down the expansion order to find a path from UQ to Toowong if we use:

A. [10 marks] Breadth first search.
B. [10 marks] Depth first search.
C. [10 marks] A* search. Please use the following as the heuristic function. h(UQ) = 30; h(A) = 25; h(B) = 15; h(C) = 9; h(D) = 28; h(E) = 12; h(F) = 13; h(G) = 7; h(Toowong) = 0.

2. Questions on properties of search algorithms and heuristic.
   A. [10 marks] Please state the main benefit of using Depth First Search compared to Breadth First Search.
   B. [10 marks] Is the heuristic function in question 1D admissible? Please explain why.
   C. [10 marks] Is the heuristic function in question 1D consistent? Please explain why.

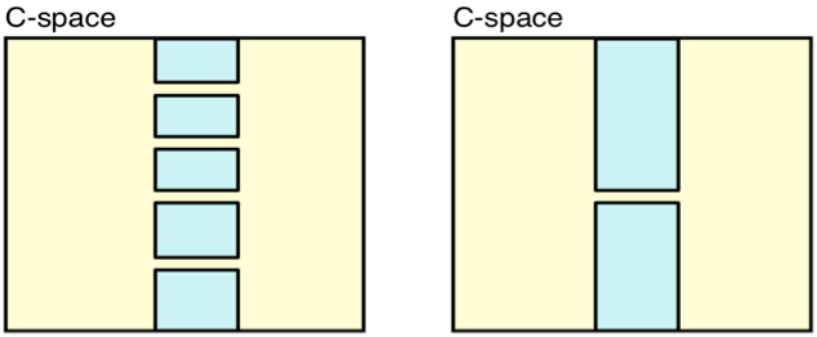

Fig. 2. 2D C-space. Forbidden regions are rectangles with darker color. The sizes of each narrow passage on the left and right pictures are the same

3. Suppose we need to solve two motion planning problems, where the configuration spaces (C-space) are as shown in Fig. 2. Fig. 2 Left is the C-space for Problem-1, while Fig. 2 Right is the C-space for Problem-2. If we solve both problems using PRM with uniform random sampling,
   A. [10 marks] which of these statements are correct:
      a. It is more difficult to find the solution in Problem-1 than in Problem-2.
      b. It is more difficult to find the solution in Problem-2 than in Problem-1.
      c. Problem-1 and Problem-2 are equally difficult.
   B. [10 marks] Please give a brief explanation for your answer to question A.

4. Suppose you have the following statements in your knowledge base.
   - $(P \rightarrow Q) \vee (R \rightarrow S)$
   - $\sim Q$

   A. [10 marks] Please write down the CNF format of the knowledge base.
   B. [10marks] Please show the knowledge base implies $(P \rightarrow S) \vee (R \rightarrow S)$ using resolution refutation.