

科目：412 演算法

系組：資工系

考生注意：1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 試題隨卷繳回。

1. In the Knapsack problem, if the size of each object is arbitrary real number, does the dynamic programming method still work? Explain your opinion in detail. (10%)
2. For an AVL tree, write a C or java program to perform the R-R, L-L, R-L, L-R rotations, respectively. Explain your algorithm briefly. (20%)
3. Suppose your squad consisted of six snipers. All of them are equally proficient in marksmanship. Each sniper is disposed to a firing position shown in figure 1 to defend your battlefield.
 - a. How should you construct the system of job responsibility so that any approaching enemy who has entered the rifle range will always be engaged by the nearest sniper? Outline an algorithm based upon the divide-and-conquer strategy to solve the above problem. (15%)
 - b. Use figure 1 as an example to explain your method in detail. (15%)

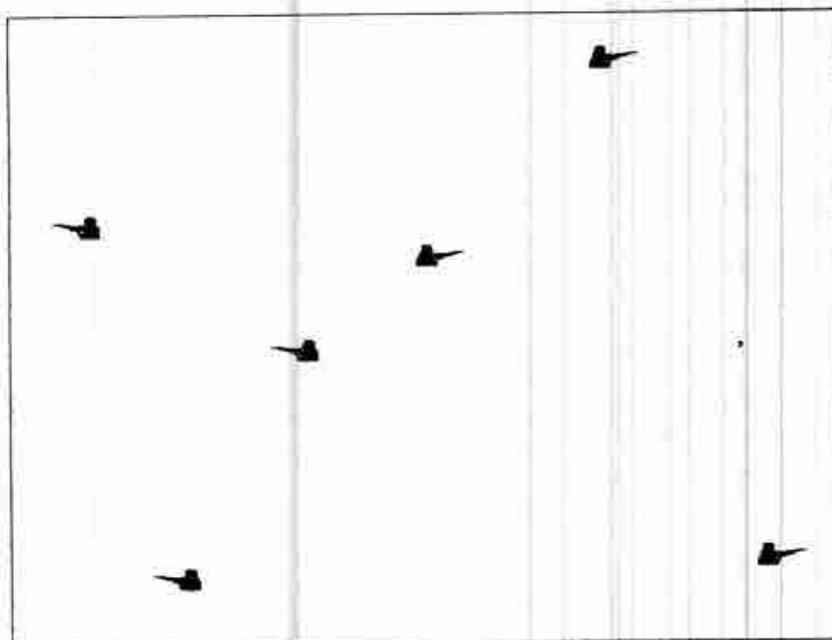


Figure 1.

4.
 - a. Write C-like or JAVA-like pseudo-codes based on the Dijkstra's algorithm to generate the single-source shortest paths. (15%)
 - b. Explain the time complexity of Dijkstra's algorithm. (5%)
 - c. Use the Dijkstra's algorithm to find the shortest paths from V_0 to all other nodes in

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figure 2. (15%)

d. Will greedy method work for the above problem? Explain your answer. (5%)

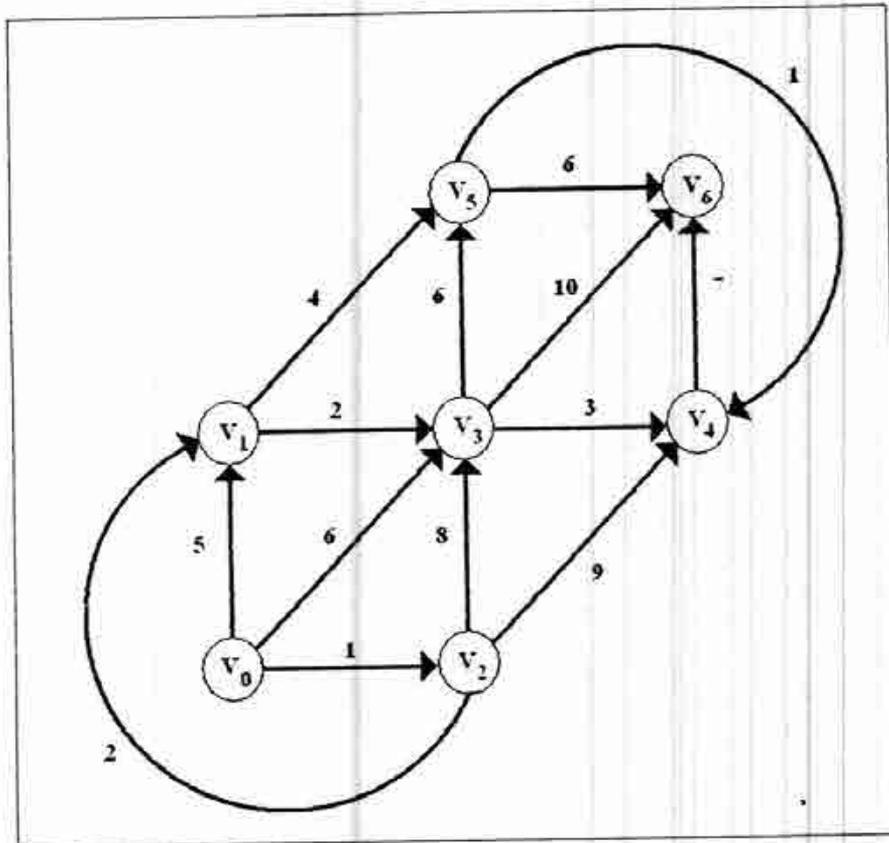


Figure 2.