

國立臺灣師範大學 101 學年度碩士班招生考試試題

科目：程式設計

適用系所：應用電子科技學系

注意：1.本試題共 1 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則依規定扣分。

1. (共 20 分) Please develop a program based on the following requirements.
 - (a) (10 分) Develop the codes of dynamic memory allocation function for an $m \times n$ two-dimensional matrix.
 - (b) (10 分) Design the program of the matrix multiplication based on the dynamically allocated memory with 1-(a).

2. (共 20 分) Please develop a program based on the following requirements.
 - (a) (5 分) Define a structure data type that contains two fields: "ID" (integer type) and "Value" (float type).
 - (b) (15 分) Develop the data sorting function for a structure array in a descendent order, where each element in the array is defined as 2-(a) and the sort key is the field "Value".

3. (共 20 分) Please develop programs of the recursive binary search (5 分) and the non-recursive binary search (10 分). Then compare the memory usage and timing complexity for the two versions of the search programs (5 分).

4. (共 20 分) Please develop a program based on the following requirements.
 - (a) (5 分) Please define the data structure of a priority queue.
 - (b) (10 分) Please develop the function codes of inserting a node on a priority queue.
 - (c) (5 分) Please develop the function codes of deleting a node on a priority queue.

5. (共 20 分) Please develop a program based on the following requirements.
 - (a) (5 分) Please define the data structure of a graph with an adjacency matrix.
 - (b) (15 分) Please develop the function codes of finding the minimum spanning tree on the graph with the data structure defined in 5-(a).