注意事項：

　1.答案依序書寫於答案卷上，不必抄題。
　2.答案卷不可書寫任何可辨別個人姓名或特殊標記，違者不予計算。
　3.請於試題紙上填寫准考證號碼，繳卷時「試題」、「答案卷」一併繳回。

試題說明【每題 10 分，總分 100 分】

1、現有六個尚未排序過的數字，依序為 55，21，14，89，37 及 21，請利用快速排序法(Quick Sort)，將這六個數字由小到大排序好。注意：請利用最左邊的數字為基準值，並詳細寫出每一次的排序過程，否則以零分計算。

2、Please use Prim's algorithm to find minimum spanning tree (MST) of the following graph. (Note: Detailed steps are required; otherwise, you will get zero point.)
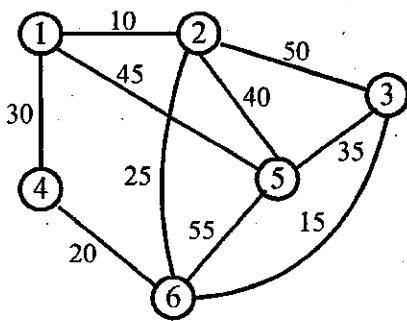
3、Describe three different Binary Tree Traversals.

4、Use the small database shown in Figure (1), create new table for each of the relational algebra.
　(1) Table STUDENT **NATURAL JOINT** Table PROFESSOR.
　(2) Table STUDENT **RIGHT OUTER JOIN** Table PROFESSOR.
　(3) Table STUDENT **LEFT OUTER JOIN** Table PROFESSOR.

Table name: STUDENT

STU_CODE	PROF_CODE
100278	
128569	2
512272	4
531235	2
531268	
553427	1

Table name: PROFESSOR

PROF_CODE	DEPT_CODE
1	2
2	6
3	6
4	4

Figure (1) The College Que Database Tables

5、Consider the following processes:

Process	Arrival Time	Burst Time
P1	0	6
P2	2	4
P3	3	2
P4	5	8

(a) Using a non-preemptive SJF scheduler, calculate the average waiting time and processes. (b) Using a preemptive RR scheduler (Time quantum 4 units), calculate the average waiting time and processes.

背面有試題

6、Please describe the procedure if a process on an operating system over a virtual machine makes a system call.

7、Explain notions "Miss", "Miss Penalty", and "Miss rate" in memory hierarchy.

8、Use the following BNF definition to find the parsing tree from the expressions:

(1) K1 * I 0 + T * L 1 + M 0 * F + M 1

<EP>:: = <EP><OP><TT> | <TT>

<op>::= + | *

<TT>::=<cc> | <LL><NN>

<CC>::= T | F

<NN>::= 0 | 1

<LL>::= I | J | K | L | M | N

9、Given a system that assigns three frames for each process. Execute the following page replacement algorithms to compute the number of page faults, respectively with the page reference string: 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
   (a) FIFO algorithm
   (b) LRU algorithm

10、(1) What is the optimal Huffman code for the following set of frequencies, based on the first 8 Fibonacci numbers?

A：1 B：1 C：2 D：3 E：5 F：8 G：13 H：21

(2) Please design an algorithm to find the optimal Huffman code when the frequencies are the first n Fibonacci numbers?