

國立彰化師範大學111學年度碩士班招生考試試題

系所： 統計資訊研究所(選考丁)

科目： 資料結構

☆☆請在答案紙上作答☆☆

共4頁，第1頁

一、(50%)請寫出下列程式碼的執行結果(共5題，每題10分)：

(1)

```
#include <stdio.h>
int main() {
    int n = 12345, rev = 0, remainder;
    while (n != 0) {
        remainder = n % 10;
        rev = rev * 10 + remainder;
        n /= 10;
    }
    printf("%d", rev);
    return 0;
}
```

(2)

```
#include <stdio.h>
int addNumbers(int n);
int main() {
    int num = 100;
    printf("Sum = %d", addNumbers(num));
    return 0;
}
```

```
int addNumbers(int n) {
    if (n != 0)
        return n + addNumbers(n - 1);
    else
        return n;
}
```

(3)

```
#include <stdio.h>
void cyclicSwap(int *a, int *b, int *c);
int main() {
    int a = 1, b = 2, c = 3;
    cyclicSwap(&a, &b, &c);
}
```

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共4頁，第2頁

```
printf("%d %d %d", a, b, c);
return 0;
}

void cyclicSwap(int *n1, int *n2, int *n3) {
    int temp;
    temp = *n2;
    *n2 = *n1;
    *n1 = *n3;
    *n3 = temp;
}

(4)
#include <stdio.h>
int main() {
    int rows = 5, i, j, number = 1;
    for (i = 1; i <= rows; i++) {
        for (j = 1; j <= i; ++j) {
            printf("%d ", number);
            ++number;
        }
        printf("\n");
    }
    return 0;
}

(5)
#include <stdio.h>
void printArray(int array[], int size) {
    for (int i = 0; i < size; i++) {
        printf("%d ", array[i]);
    }
    printf("\n");
}

void sort(int array[], int size) {
    for (int step = 1; step < size; step++) {
        int key = array[step];
```

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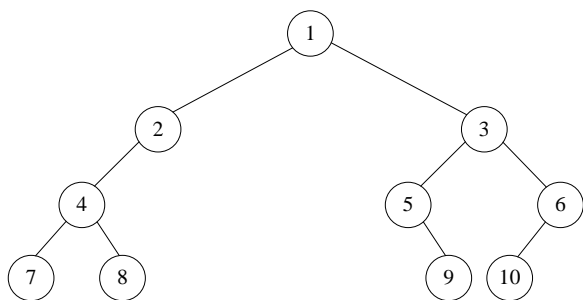
共4頁，第3頁

```
int j = step - 1;
while (key < array[j] && j >= 0) {
    array[j + 1] = array[j];
    --j;
}
array[j + 1] = key;
printArray(array, size);
}
}

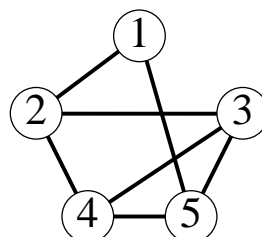
int main() {
    int data[] = {2, 5, 1, 4, 3};
    int size = sizeof(data) / sizeof(data[0]);
    sort(data, size);
}
```

二、(10%) You are coding a program to record the data of items (貨品) of your store. You have decided to record item name (貨品名稱), cost (進價), sale price (售價), P-volume (進貨量), and inventory (庫存量) and store these data in a binary tree. Assumed that you frequently remove old items and add new items in your sales list (銷售清單), how would you implement this binary tree in your program? Please explain your answer. Answers without explanation get 0 point.

三、(10%) Write the traversal result of the following binary tree: (a) breadth-first; (b) depth-first.



四、(10%) Given the following graph, please write its (a) adjacency lists (b) sequential representation with a one-dimensional array



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科目： 資料結構

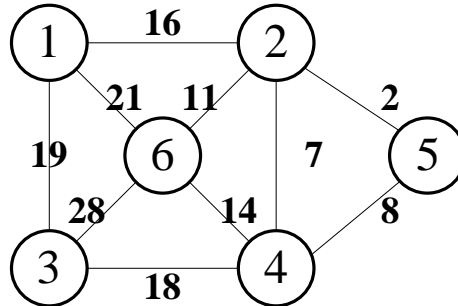
☆☆請在答案紙上作答☆☆

共4頁，第4頁

五、(10%) Find the minimum-cost spanning tree of the following graph by using

(a) Kruskal's algorithm and (b) Prim's algorithm.

(Note: You have to draw the immediate steps or briefly explain your reason for your answers. Right answers without explanation get only 2 points).



六、(10%) For the AOE (Activity On Edge) network of the following graph

(a) Obtain the early and late start times for each activity. Use the forward-backward approach

(b) What is the earliest time the project can finish?

