

# 國立彰化師範大學 104 學年度碩士班招生考試試題

系所： 數學系

組別： 丙組

科目： 資料結構

☆☆請在答案紙上作答☆☆

共 3 頁，第 1 頁

## 1. What does the following program print? (10%)

```
#include <stdio.h>
int main(){
    int j=0, a[5]={10,20,30,40,50};
    j++;
    printf("%d", a[++j]);
    return 0;
}
```

## 2. What does the following program print? (10%)

```
#include <stdio.h>
int main(){
    int j, sum=0;
    for (j=1; j<100; j+=2){
        sum+=j;
    }
    printf("%d", sum);
    return 0;
}
```

## 3. What does the following program print? (10%)

```
#include <stdio.h>
#include <math.h>
int main(){
    int a, b, j;
    for (j=0; j<10; j++){
        a=j;
        b=9-j;
        printf("%d", ((a+b)+abs(a-b))/2);
    }
    return 0;
}
```

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## 4. What does the following program print? (10%)

```
#include <stdio.h>
int main(){
    int i, j, k, a[3][2]={{1,0},{2,1},{0,2}}, b[2][3]={{1,0,1},{1,1,0}}, c[3][3]={0};
    for (i=0; i<3; i++){
        for (j=0; j<3; j++){
            for (k=0; k<2; k++){
                c[i][j]+=a[i][k]*b[k][j];
                printf("%2d", c[i][j]);
            }
        }
    }
    return 0;
}
```

## 5. What does the following program print? (10%)

```
#include <stdio.h>
#define TRUE 1
#define FALSE 0
#define SIZE 9
int main(){
    int num=0, a[SIZE]={4,1,3,8,7,9,6,2,5}, flag=TRUE, j, temp;
    while (flag){
        flag=FALSE;
        num++;
        for(j=0; j<SIZE-1; j++){
            if (a[j+1]>a[j]){
                temp=a[j+1];
                a[j+1]=a[j];
                a[j]=temp;
                flag=TRUE;
            }
        }
    }
    printf("%d", num);
    return 0;
}
```

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共 3 頁，第 3 頁

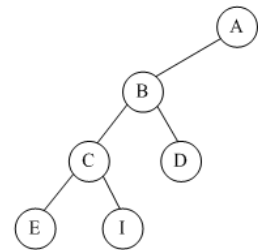
6. Please order the following time complexity, suppose  $n$  is sufficiently large. (5%)

$O(n)$ ;  $O(\log n)$ ;  $O(n^2)$ ;  $O(2^n)$ ;  $O(n!)$

7. (a) Please transform the infix expression  $(a+b)*d+e/(f+a*d)+c$  into postfix form. (5%)

(b) What is the calculation result of the postfix expression  $6\ 2/3-4\ 2*+?$  (5%)

8. Please draw the threaded binary tree of the following binary tree. (5%)



9. Suppose that we have the following key values: 7, 16, 49, 82, 5, 31, 6, 2, 44 and we want to use min heap implemented by an array to store these values. Write out the content in the array after each value is inserted into the min heap. (5%)

10. Please briefly answer what is a full binary Tree? What is a complete binary Tree? (5%)

ANS:

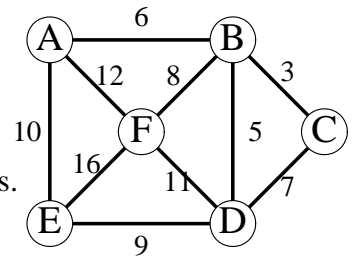
11. Find the minimum-cost spanning tree of the following graph by using

(a) Kruskal's algorithm (5%)

(b) Sollin's algorithm. (5%)

(Note: You have to draw the immediate steps or briefly explain your answers.

Right answers without explanation get only 2 points).



12. Please find the shortest paths from vertex 5 to all other vertices of the following graph by Dijkstra's algorithm. (Note: You have to show your calculation steps or briefly explain your answers. Right answers without explanation get only 4 points). (10%)

ANS:

