

國立彰化師範大學107學年度碩士班招生考試試題

系所：數學系(選考丁)、

科目：資料結構

統計資訊研究所(選考丁)

☆☆請在答案紙上作答☆☆

共4頁，第1頁

一、請寫出下列程式執行結果 (50%)

(1)

```
#include <stdio.h>
int main(){
    int x=1, y=1, t;
    printf("%3d%3d", x, y);
    t=x+y;
    while (t<100){
        printf("%3d", t);
        x=y;
        y=t;
        t=x+y;
    }
    return 0;
}
```

(2)

```
#include <stdio.h>
#define N 9
int main(){
    int i=1, j=N-1, k, t, a[N]={5,1,8,2,9,7,3,4,6};
    while (a[i]<a[0])
        i++;
    while (a[j]>a[0])
        j--;
    t=a[i];
    a[i]=a[j];
    a[j]=t;
    for (k=0; k<N; k++)
        printf("%3d", a[k]);
    return 0;
}
```

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共 4 頁，第 2 頁

(3)

```
#include <stdio.h>
#define N 5
int ex(int*);
int main(){
    int i,a[N]={1,2,3,4,5};
    for (i=0; i<N; i++)
        printf("%3d", ex(&a[i]));
    return 0;
}
int ex(int *p){
    if (*p%2==0)
        *p=(*p)*(*p);
    else
        ++(*p);
    return *p;
}
```

(4)

```
#include <stdio.h>
#define N 4
int main(){
    int i, j, a[N][N]={{1,0,0,1},{1,1,0,1},{0,1,1,1},{1,0,1,0}};
    for (i=0; i<N; i++)
        for (j=0; j<N; j++)
            if (a[i][j]==1)
                a[j][i]*=-1;
    for (i=0; i<N; i++){
        for (j=0; j<N; j++)
            printf("%3d", a[i][j]);
        printf("\n");
    }
    return 0;
}
```

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共 4 頁，第 3 頁

(5)

```
#include <stdio.h>
#define N1 5
#define N2 3
int main(){
    int i=0, j=0, a[N1]= {1,3,5,7,9}, b[N2]= {2,4,6};
    do {
        if (a[i]<b[j]){
            printf("%3d", a[i]);
            i++;
        } else {
            printf("%3d", b[j]);
            j++;
        }
    } while ((i<N1) && (j<N2));
    while (i<N1)
        printf("%3d", a[i++]);
    while (j<N2)
        printf("%3d", b[j++]);
    return 0;
}
```

二、 Please briefly explain

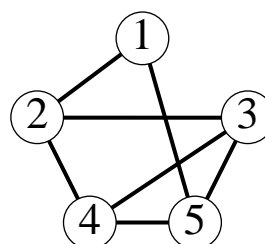
- (1) What is a binary search tree? (5%)
- (2) What is a max heap tree? (5%)

ANS :

三、 Given the following graph, please write its

- (1) adjacency matrix ; (5%)
- (2) adjacency multilists. (5%)

ANS :



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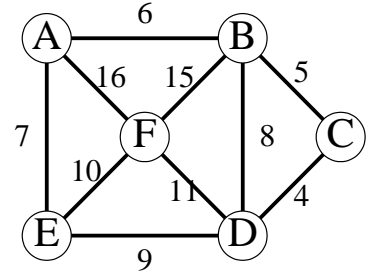
科目： 資料結構

☆☆請在答案紙上作答☆☆

共 4 頁，第 4 頁

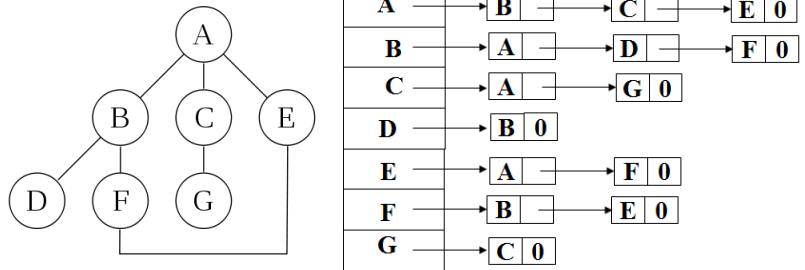
四、 Find the minimum-cost spanning tree of the following graph by using Kruskal's algorithm. (10%) (Note: You have to draw the immediate steps or briefly explain your reason. Answers without explanation get only 4 points).

ANS :



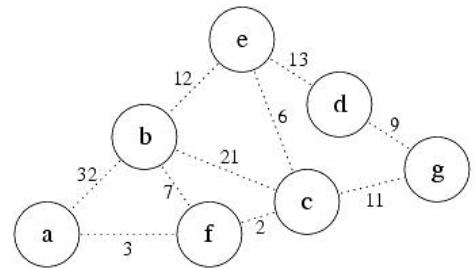
五、 Assume that we start the traversal from Vertex A and the graph is stored by adjacency list as shown in the follows. What is the traversal result (the order of the visited vertex) of depth-first search. (10%)

ANS :



六、 Please complete the following table which is used to find the shortest paths from vertex a to all other vertices of the following graph by Dijkstra's algorithm. (10%)

ANS :



Iteration	Vertex selected	a	b	c	d	e	f	g
Initial	-	0	32	∞	∞	∞	3	∞
1	f	0						
2		0						
3		0						
4		0						
5		0						