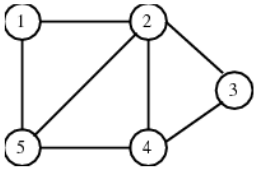
國立彰化師範大學 98 學年度碩士班招生考試試題

系所：資訊工程學系　　科目：資料結構及程式設計

☆☆請在答案紙上作答☆☆　　

1. A system supports Stack data type, but does not support Queue data type. Please write pseudo-code to implement the enqueue (a) (insert a into queue) (4%) and dequeue (b) (delete the first element from queue) (6%) operations by using Stack data type and its associated operations.

2. Please write down the following graph representations respectively, and their corresponding declaration of the data structure for the graph below. (15%)



(a) Adjacency Matrix

(b) Adjacency Lists

(c) Adjacency Multilists

3. (a)Please explain the main disadvantage of binary search tree (BST), (b) and under what kind of situation the worst case will happen. (c)Why can AVL tree improve this problem? Please use an example to illustrate (b) and (c). (10%)

4. Explain why an in-order traversal on a binary search tree should produce the values of the tree in numerical or alphabetical order. (5%)

5. There are two data sets X, Y. X contains M elements, Y contains N elements. Now we need to find the elements appearing in both data sets. One of the methods is that comparing every element in data set X to every element in data set Y. Assume the system already has the string comparison function, and its time complexity is O(1).

(a) Please explain the time complexity in big oh notation for above method. (3%)

(b) Please design a time complexity O(N+M) method for this problem. You need to justify your solution. Please use the following data sets to illustrate your ideas

Data set X: { 23, 45, 458, 51, 911123, Mary, John, 24, 1947, 111, 2, Jim, 21}

Data set Y: { 111, John, 23, 45, 5421, James, 1954, 541, 1947454, 51, 53, 42, 75, 518, Johns} (7%)

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6. Write the output of the following program. (8%)

```
int func(int, int);
int main(void)
{
    printf("func(2, 4) = %d\n", func(2,4));
    printf("func(111, 19) = %d", func(111, 19));
    return 0;
}
int func(int x, int y)
{
    if (x == y)
        return x;
    else {
        if (x < y)
            return x + func(x+1, y);
        else
            return x + func(x-1, y);
    }
}
```

7. Write the output of the following program. (8%)

```
int a, b;
for (a=1, b=1; a<=100; a++) {
    if (b>=18)  break;
    if (b%3==1) {
        b+=2;
        continue;
    }
    b++;
    printf("b = %d\n", b);
}
printf("a = %d", a);
```

8. Write the output of the following program. (8%)

```
void add(int x, int* y, int* w, int **p)
{
    static int z = 2;
    *w = z++;
    x++;   y++;   (*p)++;
}
int main(void)
{
    int a[] = { 2, 4, 6, 8, 10, 12, 14 };
    int i, x = 5, *y = a+1, z = 0, *q = a+2;
    int **p = &q;

    for (i=0; i<3; i++) {
        add(x, y, &z, p);
        printf("%d, %d, %d, %d\n", x, *y, z, *q);
    }
    return 0;
```

```
    }
```

9. Write the output of the following program. (6%)

```
#define M(a,b) a*b
int main(void)
{
    int i = 5, j = 6;
    printf("i*j = %d", M(i+2, j-2*2));
    return 0;
}
```

10. Rewrite and correct the following program. (8%)

```
include [stdio.h]
int main(void)
{
   int i=1, j=5
   If (i < j)
       i++;   j--;
   else   /* i >= j
       printf("% >= %", &i, &j);
   return 0;
}
```

11. Which could be the second line of the program? (multiple-choice, more than one answer) (6%)

```
 int i=1, j=2;
```

(a) `int *p[2] = {&i, &j};`
(b) `int (*p)[2] = {&i, &j};`
(c) `int* p[2] = {&i, &j};`
(d) `int p[2] = {&i, &j};`

12. Which are NOT the keywords in C? (multiple-choice, more than one answer) (6%)

(a) which　(b) void
(c) until　(d) signed
(e) static　(f) then