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國立臺北科技大學九十八學年度碩士班招生考試

系所組別：4300 資訊與運籌管理研究所不分組

第一節 計算機概論 試題

第一頁 共二頁

注意事項：

1. 本試題共八題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、What does the following program print? (10%)

```
#include<iostream.h>
void function(int x[][3], int y[][2], int z[][2])
{
    for (int i = 0; i < 2; i++)
        for (int j = 0; j < 2; j++) {
            z[i][j] = 0;
            for (int k = 0; k < 3; k++)
                z[i][j] += x[i][k] * y[k][j];
        }
}
int main(void)
{
    int x[2][3] = { {1, 2, 3}, {4, 5, 6} };
    int y[3][2] = { {1, 5}, {5, 3}, {8, 1} };
    int z[2][2];

    function(x, y, z);
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 2; j++)
            cout << z[i][j] << ' ';
        cout << '\n';
    }
    return (0);
}
```

二、What does the following program print? (10%)

```
#include<iostream.h>
int function(int x, int y)
{
    int a = (x > y) ? x : y;
    int b = (x > y) ? y : x;

    if (b == 0) return (a);
    else return (function(b, a % b));
}

int main(void)
{
    int x=24, y=20;

    cout << "Output: " << function(x, y) << "\n";
    return (0);
}
```

三、What does the following program print? (10%)

```
#include<iostream.h>
class Position {
private:
    double xp;
    double yp;
public:
    Position(void) { xp = 0.0; yp = 0.0; }
    Position(double x, double y = 0.0) { xp = x; yp = y; }
    double X(void) const { return (xp); }
    double Y(void) const { return (yp); }
    void Set(double x, double y) { xp = x; yp = y; }
};

inline ostream& operator<<(ostream& os, const Position& pos)
{ return (os << '(' << pos.X() << ", " << pos.Y() << ')'); }

int main(void)
{
    const Position pos_O(1.0,1.0);
    Position a(5.0, 6.0);

    cout << "原點 = " << pos_O << '\n';
    cout << "a = " << a << "\n";
    a.Set(-3.0, 2.0);
    cout << "a = " << a << '\n';
    return (0);
}
```

注意：背面尚有試題

四、Write a Dynamic Programming algorithm for determining an optimal binary search tree. (20%)

五、What is the time complexity $T(n)$ of the nested loops below? Assume that $n = 2^k$ for some positive integer k . (10%)

```
⋮
i = n;
while (i ≥ 1) {
    j = i;
    while (j ≤ n) {
        <body of the while loop> // Needs  $\theta(1)$ .
        j = 2 * j;
    }
    i = ⌊i/2⌋;
}
⋮
```

六、Describe how streaming video works. Streaming video refers to video you can play on the Internet. (10%)

七、Design a one-bit full adder, using AND, OR, and XOR gates. (10%)

八、Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53, and the previous request was at cylinder 88. The queue of pending requests, in FIFO order, is:

98, 183, 37, 122, 14, 124, 65, 67.

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for the following disk-scheduling algorithms?

1. shortest-seek-time-first (SSTF) algorithm. (10%)
2. SCAN (elevator) scheduling. (10%)