國立臺北科技大學 100 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

第一節 計算機概論 試題

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%)

```java
class Counter
{
    private static int count1;
    private int count2;
    public Counter()
    {
        count1++;    count2++;
    }
    public void display()
    {
        System.out.println("count1 = " + count1);
        System.out.println("count2 = " + count2);
    }
}
public class Ex1
{
    public static void main(String[] args)
    {   int i = 1;
        Counter r = new Counter();
        while (i++ <= 100)
            r = new Counter();
        r.display();
    }
}
```

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

```java
class A
{
    private int x;
    public A()
    {   x = 1;   }
    public void xDisplay()
    {   System.out.println("x = " + x);   }
}
class B extends A
{
    private int y;
    public B()
    {   y = 2;   }
    public B(int yy)
    {   super();    y = yy;              }
    public void xyDisplay()
    {   xDisplay();
        System.out.println("y = " + y);
    }
}
class C extends B
{
    private int z = 4;
    public void xyzDisplay()
    {   xyDisplay();
        System.out.println("z = " + z);
    }
}
class Ex2
{
    public static void main(String[] args)
    {
        B b = new B(3);
        b.xyDisplay();
        C c = new C();
        c.xyzDisplay();
    }
}
```

注意：背面尚有試題

三、Write an algorithm that reads the number of terms to sum and then sums that number of terms in the series

$$4 - 4/3 + 4/5 - 4/7 + 4/9 - 4/11 + \ldots$$

For example, if the user enters 100, then your algorithm should sum the first 100 terms of the series. (10%)

四、Consider the multiplication of the following four matrices:

$$A \quad \times \quad B \quad \times \quad C \quad \times \quad D$$
$$20 \times 2 \quad 2 \times 30 \quad 30 \times 12 \quad 12 \times 8$$

In this case, we have the following number of elementary multiplications for each order.

$A(B(CD))$ $30 \times 12 \times 8 + 2 \times 30 \times 8 + 20 \times 2 \times 8 = 3680$

$(AB)(CD)$ $20 \times 2 \times 30 + 30 \times 12 \times 8 + 20 \times 30 \times 8 = 8880$

$A((BC)D)$ $2 \times 30 \times 12 + 2 \times 12 \times 8 + 20 \times 2 \times 8 = 1232$

$((AB)C)D$ $20 \times 2 \times 30 + 20 \times 30 \times 12 + 20 \times 12 \times 8 = 10320$

$(A(BC))D$ $2 \times 30 \times 12 + 20 \times 2 \times 12 + 20 \times 12 \times 8 = 3120$

The third order is the optimal order for multiplying the four matrices. Write an algorithm that determines the optimal order for multiplying n matrices. (20%)

五、Describe how Flash works. (10%)

六、Let T be an empty AVL tree. Twelve months are inserted into the AVL tree T in the order, March, May, November, August, April, January, December, July, February, June, October, and September. Draw the AVL tree T. (10%)

七、Declare a data structure to implement a "priority queue." Design an algorithm which performs an insertion into the priority queue. (10%)

八、Explain the four terms: virtual machine, infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). Please give examples to explain each term. (20%)