介面

請將 1.程式**執行結果**截圖置入作業中、2.**程式原始檔**置入作業中

一、請參考投影片內容，編寫下列程式

以下每一題的 main()都已經提供於 moodle 中，請勿修改 main() 的內容。

1) 建立一個計算機類別 CCalculator，包含 double 資料變數 result(用來存放運算結果)。讓計算機類別實作一個 IBasicCompute 介面，該介面定義包含兩個參數的四個方法 Add,Sub,Mul,Div，代表加減乘除運算。(ex9_01.java)

```java
import java.lang.*;

public class ex9_01
{
    public static void main(String args[])
    {
        CCalculator obj1 = new CCalculator();
        double a,b;
        a=Math.random()*20;
        b=Math.random()*10;

        System.out.println(a + " Add " + b + " = " +obj1.Add(a,b));
        System.out.println(a + " Sub " + b + " = " +obj1.Sub(a,b));
        System.out.println(a + " Mul " + b + " = " +obj1.Mul(a,b));
        System.out.println(a + " Div " + b + " = " +obj1.Div(a,b));

    }
}
interface IBasicCompute //定義介面
{
    public double Add(double a,double b);
    public double Sub(double a,double b);
    public double Mul(double a,double b);
    public double Div(double a,double b);
}
class CCalculator implements IBasicCompute
{
    public double Add(double a,double b)
    {
        return a+b;
    }
    public double Sub(double a,double b)
    {
        return a-b;
    }
    public double Mul(double a,double b)
    {
        return a*b;
    }
    public double Div(double a,double b)
    {
        return a/b;
    }

}
```

```
系統管理員: C:\Windows\system32\cmd.exe
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C:\Users\Administrator>cd /test

C:\test>javac ex9_01.java

C:\test>java ex9_01
12.697098032810823 Add 5.124007112760508 = 17.82110514557133
12.697098032810823 Sub 5.124007112760508 = 7.573090920050315
12.697098032810823 Mul 5.124007112760508 = 65.06002063154011
12.697098032810823 Div 5.124007112760508 = 2.477962608832209

C:\test>
```

2) 同上題，定義一個 IAdvCompute 介面，當中記載一個自然指數欄位 e，資料值為 2.71828182845905。兩個方法，LOG(double x)與 LN(double x)，用來求以 10 為底及以自然指數為底的對數值。並使用 CCalculator 類別同時實作 IBasicCompute 介面與 IAdvCompute 介面。(ex9_02.java)

【註 1】：LOG(double x)的實作中，可使用 Math.log10(x)求?以 10 為底的對數。

【註 2】：不可使用 Math.log(x)求?以 e 為底的對數，請於 LN(double x)的實作中，使用自行設計的 LOG(double x)求得解答，換底公式為 lnx=(log10x)/(log10e)。

```
13              System.out.println(a + " Sub " + b + " = " +obj1.Sub(a,b));
14              System.out.println(a + " Mul " + b + " = " +obj1.Mul(a,b));
15              System.out.println(a + " Div " + b + " = " +obj1.Div(a,b));
16              System.out.println("log(" + a + ") = "   +obj1.LOG(a));
17              System.out.println("ln(" + a + ") = "    +obj1.LN(a));
18          }
19      }
20
21      interface IBasicCompute //定義介面
22      {
23          public double Add(double a,double b);
24          public double Sub(double a,double b);
25          public double Mul(double a,double b);
26          public double Div(double a,double b);
27      }
28      interface IAdvCompute //定義介面
29      {
30          double e=2.71828182845905;
31          double LOG(double x);
32          double LN(double x);
33
34      }
35      class CCalculator implements IBasicCompute,IAdvCompute
36      {
37          double result;
38
39          public double Add(double a,double b)
40          {
41              result = a+b;
42              return result;
43          }
44          public double Sub(double a,double b)
45          {
46              result = a-b;
47              return result;
48          }
49          public double Mul(double a,double b)
50          {
51              result = a*b;
52              return result;
53          }
54          public double Div(double a,double b)
55          {
56              result = a/b;
57              return result;
58          }
59          public double LOG(double x)
60          {
61              result = Math.log10(x);
62              return result;
63          }
64          public double LN(double x)
65          {
66              result = Math.log10(x)/Math.log10(e);
67              return result;
68          }
69      }
```

```
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C:\Users\Administrator>cd /test

C:\test>javac ex9_02.java

C:\test>java ex9_02
17.331854970350648 Add 7.566446480861432 = 24.898301451212077
17.331854970350648 Sub 7.566446480861432 = 9.765408489489216
17.331854970350648 Mul 7.566446480861432 = 131.14055304721037
17.331854970350648 Div 7.566446480861432 = 2.2906201760879217
log(17.331854970350648) = 1.2388450462843341
ln(17.331854970350648) = 2.8525461361038214

C:\test>
```