JAVA Programming Language Homework VIIII: OO Review

ID: **Name:**

1.   Given the following Java code:

```
10.        interface A { public int getValue();}
11.        class B implements A {
12.                public int getValue() { return 1;}
13.        }
14.        class C extends B {
15.                // insert code here
16.        }
```

What three code fragments individually at line 15, make used of polymorphism? (Choose three)

(A) public void add (C c) {c.getValue();}
(B) public void add (B b) {b.getValue();}
(C) public void add (A a) {a.getValue();}
(D) public void add (A a, B b) {a.getValue();}
(E) public void add (C c1, C c2) {c1.getValue();}

ANS: B C D

- 題目是要有多型的特徵
- A, E: 傳入 C 型別參數, 本身就是 C 的實體, 以 C 物件呼叫 getValue(), 並未有多型的特徵
- B, C, D: 傳入 A 或 B 型態的參數, 而本身的物件實體 is-a A 或 B, 就是利用了多型的特徵

2.   Given the following Java code:

```
1.        class Test {
2.                static void alpha() { /* more code here */ }
3.                void beta(){ /* more code here */ }
4.        }
```

Which two statements are true? (Choose two)

(A) Test.beta() is a valid invocation of beta()
(B) Test.alpha()is a valid invocation of alpha()
(C) Method beta() can directly call method alpha()
(D) Method alpha()can directly call method beta()

ANS: B C

- alpha() 是 static method; 所以直接 Test.alpha() 即可呼叫使用
- beta() 是 non-static method; 則必須建構物件實體才可呼叫使用
- 在 beta() 中可以直接呼叫使用相同類別之 static method
- static method 則無法直接呼叫使用 non-static method

3. Given the following Java code:

```
1.       class D extends C {
2.          private int v1 = 3;
3.          String tmp = "D";
4.          void m( ) {
5.             System.out,print(tmp + ",");
6.             System.out.print(((C)this).tmp + ",");
7.             System.out.print(((B)this).tmp + ",");
8.             System.out.print(((A)this).tmp + ",");
9.          }
10.         public static void main ( String[ ] args) {
11.            new D( ).m( );
12.         }
13.      }
14.      class A {String tmp = "A";}
15.      class B extends A {String tmp = "B";}
16.      class C extends B {String tmp = "C";}
```

What is the result of attempting to compile and run the above program?

(A) Prints: D,D,D,D
(B) Prints: D,C,B,A

(C) Compiler Error at 04.

(D) Compiler Error at 06.

(E) Compiler Error at 11.

ANS: B

類別 D 中的字串 tmp 將 superclass 中的同名字串隱藏起來，但不是覆寫。

4.　Given the following Java code:

```
1.      class A {
2.          private int x = 1;
3.          A( ) throws Exception { }
4.      }
5.      class B extends A {
6.          B( ) throws Exception { }
7.      }
8.      class C extends A {
9.          C( ) { }
10.     }
```

Which of the following statements are true? (Choose two)

(A) Class A extends Object

(B) Compiler error at 03.

(C) Compiler error at 06..

(D) Compiler error at 09.

(E) Compiler error at 02.

ANS: A D

不具備 extends 字眼的類別，預設來說會繼承 Object。

而子類別 C 的建構子應該要跟著父類別建構子丟出例外狀況。

5. Given the following Java code:

1.   interface Data {public void load();}
2.   abstract class Info {public abstract void load();}

Which class correctly uses the Data interface and Info class?

(A) public class Employee extends Info implements Data {
    public void load(){/* do something*/}
  }
(B) public class Employee implements Info extends Data {
    public void load(){/* do something*/}
  }
(C) public class Employee extends Info implements Data {
    public void load(){/* do something*/}
    public void Info.load(){/* do something*/}
  }
(D) public class Employee implements Info extends Data {
    public void Data.load(){/* do something*/}
    public void load(){/* do something*/}
  }

ANS: A

- A: 正確
- B: Info 是類別, 應使用 extends; Data 是介面, 應使用 implements
- C: 沒有 Info.load() 這種寫法
- D: 沒有 Data.load() 這種寫法

6. Given the following Java code:

1.   public abstract class Shape {
2.   int x ;
3.   int y ;
4.   public abstract void draw() ;
5.   public void setAnchor(int x, int y) {
6.   this.x = x;
7.   this.y = y;

| 8. | } |
| 9. | } |

Add a class Circle that extends and fully implements the Shape class. Which is correct?

(A) Shape s = new Shape();
   s.setAnchor(10,10);
   s.draw();
(B) Circle c = new Shape();
   s.setAnchor(10,10);
   s.draw();
(C) Shape s = new Circle();
   s.setAnchor(10,10);
   s.draw();
(D) Shape s = new Circle();
   s->setAnchor(10,10);
   s->draw();
(E) Circle c = new Circle();
   s.Shape.setAnchor(10,10);
   s.Shape.draw();

ANS: C

- 題目說明有一個類別 Circle 完全實作 Shape，故需將 Shape 抽象類別中的 draw() 方法中實作出來。
- A: 無法建構出 Shape，因為其為抽象類別
- B: 無法以抽象類別之建構子建構物件實體
- C: 正確
- D: 無此寫法
- E: 無此寫法

7. Which of the following are the valid ways to define a constructor for class Test?
 (A)   public void Test () {}
 (B)   public Test () {}
 (C)   private Test () {}

(D)   public static Test ()

(E)   final Test () {}

ANS: B C

正確的定義宣告建構子如下：

● 無傳回值型態的宣告
● 不可為 final, native, static, synchronized 及 abstract

8. Given the following Java code:

1.   class B extends A {
2.   String m(short s) {return new String();}
3.   private void m(char c) {}
4.   protected void m(int i) {}
5.   void m(String s1) {}
6.   void m(boolean b) {}
7.   void m(byte b) throws Exception {}
8.   }
9.   class A {void m(String s1) {}}

What is the result of attempting to compile and run the above program?

(A) Compiler Error at line 2.
(B) Compiler Error at line 3.
(C) Compiler Error at line 4.
(D) Compiler Error at line 7.
(E) None of the above.

ANS: E
函式的 Overloading 允許不同的回傳資料型態和不同的 throws Exception 敘述，所以本程式並無編譯錯誤。

9. Given the following Java code:

```
1.      class A {
2.          void m(A a) {private int x = 1; System.out.print("A");}
3.      }
4.      class B extends A {
5.          void m(B b) {private int x = 1; System.out.print("B");}
6.      }
7.      class C    extends B {
8.          void m(C c) {private int x = 1; System.out.print("C");}
9.      }
10.     class D {
11.        public static void main(String[] args) {
12.           A c1 = new C();
13.           B c2 = new C();
14.           C c3 = new C();
15.           C c4 = new C();
16.           c4.m(c1);
17.           c4.m(c2);
18.           c4.m(c3);
19.           System.out.print("Done!");
20.        }
21.     }
```

What is the result of attempting to compile and run the above program?

(A) Prints: AAADone!
(B) Prints: ABCDone!
(C) Prints: CCCDone!
(D) Compiler Error
(E) Run time Error

ANS: B
類別 C 繼承類別 B，類別 B 繼承類別 A。而其中各有三個函式 m，由於所納入的參數類不同，屬於函式的 overloading 而非 override。
12 至 15 行宣告了 4 個物件，其類別型態分別為 A，B，C，D。
16 行將導入型態為 A 的物件變數 c1，因而呼叫第 2 行，以此類推答案為 B。

10. Which of the following statements are true?

(A) The body of a final method can be inline by a machine-code generator.

(B) A final method is not allowed to be overridden by a sub-class.

(C) All methods declared in a final class are implicitly final.

(D) If a private method is declared final then it is a compile-time error.

(E) The methods declared in a final class must be explicitly declared final or else Java compiler will raise error.

ANS: A B C

類別 final 中所有的方法都被視為 final，但不強求加上關鍵字 final。

所有 private 方法都被 java compiler 視為 final，但不強求加上關鍵字 final。

被定義為 private 和 final 的方法是可以被繼承的。

machine-code generator 具有內嵌(Inline) final 方法的功能。