Object-Oriented Programming in Java

Quiz 1 — Jan 10, 2001

Problem 1: Who wants to be a Java developer? (with apologies to Regis)

Fill in your answer in the space provided.

Question 1: Which is these word-pairs represents the IS-A relationship (in English)?

A. duck/bird B. bird/fly
C. beak/bird D. bird/nest

Final Answer:

Question 2: Which is these pairs represents the HAS-A relationship?

A. bird/duck B. bird/fly
C. bird/beak D. bird/flying_animal

Final Answer:

Question 3: Which is these pairs represents the BEHAVES-LIKE relationship?

A. bird/duck B. bird/fly
C. bird/beak D. bird/flying_animal

Final Answer:

Question 4: Which phrase below best describes the relationship between Country and Capital?

A. IS-A B. HAS-A
C. USES D. BEHAVES-LIKE

Final Answer:

Question 5: Which Java technology best supports the IS-A relationship?

A. Inheritance B. Access Restriction
C. Strong Typing D. Garbage Collection

Final Answer:

Question 6: Which Java keyword is used to specify inheritance?

A. extends B. implements
C. public D. static

Final Answer:

Question 7: Which Java keyword is used to specify compliance with an interface?

A. extends B. implements
C. public D. static

Final Answer:

Question 8: Which Java keywords can not appear in a class declaration?

A. extends B. private
C. void D. abstract

Final Answer:

Question 9: Is it possible to use the techniques of object oriented programming in a language that does not specifically support OOP?

A. Yes B. No
C. D.

Final Answer:

Question 10: Are private classes only for malicious corporations closely guarding their proprietary code?

A. Yes B. No
C. D.

Final Answer:

Question 11: Which Java keywords can not appear in instance variable definitions?

A. extends B. protected
C. int D. private

Final Answer:

Question 12: Which Java keywords can not appear in method definitions?

A. implements B. void
C. static D. private

Final Answer:

Question 13: Which of these fragments represents the HAS-A relationship between Foo and Bar?

A. class Foo extends Bar{} B. class Foo implements Bar{ }
C. class Foo { private Bar mybar; } D. abstract class Bar extends Foo{ }

Final Answer:

Question 14: Which line of code in the following can be inserted in place of the comments, to perform the initialization described by the comments?

```
public class T {
     int r;
     int s;

     T(int x, int y) {
          r = x;
          s = y;
     }
}

class S extends T {
     int t;

     public S(int x, int y, int z){
          // insert here the code
          // that would do the correct initialization
          // r= x  and s= y
          t=z;
     }
}
```

A. T(x, y); B. this(x, y);
C. super(x, y); D. super(x, y, z);

Final Answer:

Question 15: What do the 'public' and 'private' keywords relate to?

A. Typing B. Garbage Collection
C. Polymorphism D. Access Restriction

Final Answer:

Question 16: Which Java technologies most powerfully supports the programming concept of "encapsulation"?

A. Container Classes B. Access Restriction
C. Garbage Collection D. Typing

Final Answer:

Question 17: Which Java technologies most powerfully support the programming concept of "abstraction"?

A. Inheritance and Polymorphism B. Heap Allocation
C. Garbage Collection D. Applets

Final Answer:

Problem 2: Program Analysis: Short Answer

Question 1: What are the values of `i`,`a`, and `b` after the following code fragment runs.?

```
int i;
int a=1;
int b=0;
for(i=0;i<10;i++){
   a = a * 2;
   b++;
}
```

`i =`

`a =`

`b =`

Question 2: What is the value of `a` after the following code fragment runs?

```
int a=0;
while(true){
    if(a > 20) break;
    a = a+1;
}
```

`a =`

Question 3: What three lines will the following code print out when compiled and run?

```
public class Spindle{
        public static void main(String[] args){
                int[] a = new int[] {1,2,3,4};
                int b = 5;
                int c =6;

                Fold.mutilate( a , b, c);
                System.out.println( a[0]);
                System.out.println( b);
                System.out.println( c );
        }

}

class Fold{
        static void mutilate( int[] a, int b , int c) {
                a[0] = 7;
                b = 8;
                c = 9;
        }
}
```

line1:

line2:

line3:

Question 4: What does the class Test below print out if it is compiled and run?

```
public class Test
{
        int x;

        Test(String s){
                this();
                System.out.println(s);
                System.out.println("This");
        }

        Test(int x){
                this("is");
        }

        Test(){
                System.out.println("a test.");
        }

        public static void main(String[] args)
        {
           int val = 2;
           Test t = new Test(val);
        }
}
```

Test prints out:

The next three short answer question use the following group of classes.

```
/**
 * An interface with one method
 */
interface Face1{
   public void bar();
}

/**
 * A class with an accessor and method foo()
 */
class Class1{
    private int size = 0;
    private String name;

    Class1(String name){
       this.name = name;
    }

    public String getName(){
       return(name);
    }

    public void foo(){
       System.out.println(``Class1.foo()'');
    }
}

/**
 * A class inheriting from Class1
 */
class Class2 extends Class1 implements Face1{
    int size = 0;
    int x;

    Class2(String name){
       super(name);
    }

    public void foo(){
       System.out.println(``Class2.foo()'');
    }

    public void bar(){
       System.out.println(``Class2.bar()'');
    }
}
```

Question 5: What does the following print out?

```
public class TestClass{

   public static void main(String[] args){
       Class1 c = new Class2(‘‘me’’);
       c.foo();
   }

}
```

Ans:

Question 6: What does the following print out?

```
public class TestClass{

   public static void main(String[] args){
        Class1 c = new Class1(‘‘me’’);
        c.foo();
   }

}
```

Ans:

Question 7: What does the following print out?

```
public class TestClass{

   public static void main(String[] args){
        Class2 c = new Class2(‘‘me’’);
        System.out.println(c.getName());
   }
}
```

Ans:

Question 8: What does the following print out?

```
public class TestClass{

   public static void main(String[] args){
        Face1 c = new Class2(‘‘me’’);
        c.bar();
   }
}
```

Ans:

Problem 3: Class Implementation

In this problem we ask you to implement part of a class Fraction, which represents fractions of the form a/b where a and b are integers, (1/2, 4/6, 101/432. etc.). In the space below, complete the class Fraction. Use `int` to store the numerator and denominator.

Include a constructor that initializes from a numerator and denominator.

Write an instance method for addition. [Hint: $a/b + c/d = (ad + bc)/bd$.]

Write a static method for multiplication. [Hint: $a/b * c/d = ac/bd$.]

Write a static `main()` that allocates two Fractions, 1/2 and 3/4 and stores their sum in a third variable.

(Be merciful to graders: please write clearly).

```
/**
 * Class Fraction. Represent the fraction X/Y where X and Y are integers
 */
public class Fraction{
   /**
    * Your instance vars here
    */









   /**
    * Your constructor here
    */
```

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```
    /**
     * Your add method here
     */

    /**
     * Your static mult method here
     */

    /**
     * Your static main  here
     */

}
```

Problem 4: OOP Design

You are designing an OO program to help people plan an evening out. It is proposed that the following classes be used. Add inheritance (`extends` phrases) and instance variables to show the IS-A and HAS-A relationships between these classes. Do not introduce any additional classes or and instance variables of any basic type. [Note: By Business, we mean anything that would appear in the Yellow Pages].

```
class Address
{



}

class Business
{







}

class City
{







}

class Restaurant
{







}

class Theater
{







}
```