Sample Exam Questions (Partial)

Part I. True or False (?×? point = ? points)

Determine whether each statement is **true(T)** or **false(F)** in Java according to its correctness.

1. The **`char`** type of charactors are implemented in 16 bits from `'\u0000'` to `'\uFFFF'`.
2. Single-floating-point number type **`float`** is implemented with 48 bits.
3. An array can store many different types of values.
4. The **`equals`** method is an example of a method that is inherited but can be overridden.
5. Methods that are marked **`private`** can be called in the class and its subclass.
6. The types of **`int`** and **`double`** are not true classes for performance purposes.
7. In try-with-resources structure, all the resource classes should implements **`Closable`** interface that has a method **`clear()`** to close the resource.
8. Every object in Java, no matter what class it came from, has a method called **`toString()`**.
9. The **`default`** statement of a **`switch`** structure is always executed.
10. Assume we have an abstract class `T` and two interfaces `I1` and `I2`. The following declaration is correct: `public class S implements I1, I2 extends T {...}`

Part II: Completion by Matching (?×? point = ? points)

Choose the **LETTER** that refers to the **BEST ITEM** from the alternative answers listed below to fill in the blanks in each of the following statements.

Alternative Answers:

A. assignment	**G. JVM**	**M. static**
B. double	**H. new**	**N. super**
C. classes	**I. null**	**O. symbol**
D. compiler	**J. reference**	**P. this**
E. identifier	**K. runtime**	**Q. token**
F. javac	**L. single**	**R. void**

1. A Java program typically consists of several pieces of code called _____.
2. The three types of errors for programs are syntax, _____, and semantics.
3. The default value of a non-local int variable is 0 and the default reference value is ____.
4. Java programs are executed by something called _____.
5. The keyword _____ is used to call another constructor in the same class .

Part III. Single/Multiple Choice(s) Questions (?×? points = ? points)

1. If class `Triangle` extends class `Shape`, which one of the following code segment is correct:

```
A. Triangle x = new Triangle(); Object y = (Object)x; Triangle z = y;
B. Triangle x = new Triangle();  Shape y = x;  Triangle z = (Triangle)y;
C. Shape y = new Shape();  Triangle x = (Triangle)y;  Shape z = x;
D. Shape y = new Shape();  Triangle x = (Triangle)y;  Shape z = (Shape)x;
```

2. What will be the value of num after executing the following statements?

```
int num = 5;
num += 12.8;
```

```
num = num / 9;
```

A. 9 B. 1 C. 2 D. 1.97777778 E. Runtime error

3. For the class defined as follows:

```
public class Foo { int x; }
```

Which one of the following code segment cannot compile?

```
A. Foo a = new Foo( 8 );
B. Foo a = new Foo();  String s = a.toString();
C. Foo a = new Foo();  boolean b = a.equals( "hello" );
```

4. What would the following statements display?

```
String word = "abcdefg";
for (int i = 0; i < 6; i += 2) System.out.print( word.charAt(i));
```

A. abc B.ac C. ace D. bdf E. Runtime exception

5. If no `private/protected/public` is specified for a member in a class, that member ...

A. Is only accessible by other classes of the same package

B. Is accessible publicly

C. Is accessible by the class and its subclasses

D. Is accessible by all classes of the same package

6. Dynamic binding is an essential feature for

A. Encapsulation B. Serialization C.Modulization D. Polymorphism

7. Class M defined as follows:

```
class M {
   public M ()      { System.out.print( ":-) " ); }
   public M (int n)  { this();  System.out.println( "Hi " + n ); }
}
```

What will the following instruction result in?

```
M m = new M( 2019 );
```

A. Compilation error B. Runtime error C. print: `:-) Hi 2019` D. print: `Hi 2019`

8. The following code

```
int x = 0;
int y = 8/x;
System.out.println(y);
```

will result in:

A. Compilation error: `Division must be in a try block`

B. Compilation error: `DivideByZeroException`

C. The program will display '`Infinity`'

D. The program will display 'NaN'

E. Runtime Exception

Part IV. Short Answer Questions(? points)

1. What does it print after executing the following program (`SubClass.java`)? (? points)

```
class SuperClass {
   public SuperClass () {
```

```
      System.out.println( "From SuperClass" );
   }
}
public class SubClass extends SuperClass {
   final String name;
   public SubClass () {
      this( "default" );
      System.out.println( "From Non-args SubClass" );
   }
   public SubClass (String name) {
      this.name = name;
      System.out.printf( "SubClass: name = \"%s\"\n", name );
   }
   public static void main (String[] args) {
      SubClass a = new SubClass();
   }
}
```

2. What does it print after executing the following program (TestProg2.java)? (4 points)

```
import java.util.ArrayList;
public class TestProg2 {
   public static void main (String[] args) {
      ArrayList<String> list = new ArrayList<>();
      list.add( "Java" );
      list.add( "C++" );
      list.add( "Kotlin" );
      list.add( "Python" );
      list.add( list.indexOf( "Kotlin" ), "Go" );
      list.remove( 1 );
      System.out.println( list );
   }
}
```

Part V: **Programming** (? points)

1. (? *points*) We may compute the **standard deviation(均方差)** of n floating numbers using the following formula.

$$mean = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n} \quad deviation = \sqrt{\frac{\sum_{i=1}^{n} (x_i - mean)^2}{n - 1}}$$

An array is used to store the individual numbers, so that they can be used to compute the **mean (平均值)** and the **`deviation`**. Please **write your code** to **finish the following two static methods:**

```
// Compute the standard deviation of an array of double values
public static double deviation (double[] x) { /* write your code here */  }

// Compute the mean of an array of double values
public static double mean (double[] x) {    /* write your code here */  }
```

2. (? *points*) **Write a static method** named **`pickUpInRange`** to take an two-dimensional integer array **a** and integer **`x, y`** as parameters, and to create another new two-dimensional array that each row in the new array only contains the integers in the range from **x** to **y** (inclusive) of the corresponding row in array a.

```
public static int[][] pickUpInRange (int[][] a, int x, int y) {
    // write your code here
}
```

For example, assume that a two-dimensional array **b** is defined as following:

```
int[][] b = { {1,-2,0,3}, {2,-4,0,1,8}, {0,0,10,0}, {0,18,0} };
```

Then **`pickUpInRange( b, 1, 10 )`** will return a new two-dimensional array with the following value:

```
{ {1,3}, {2,1,8}, {10}, {} }
```