Tutorial 1 - Answers

This tutorial will help you transition from using Python to using object-oriented Java. Please complete the following questions which will help you learn the basics of Java.

1. Java vs Python

a.) What is the difference between Java and Python when declaring variables?

Using Java you must explicitly declare the type of variable you are declaring such as int, String etc. However, in Python you do not. (This is static vs dynamic typing)

b.) Why is static typing considered safer than dynamic typing?

Static typing enforces the intent of the program, the variable must be what it is declared to be thus reducing the chance of undetected errors caused by wrong typing.

c.) How are methods and classes in code separated when using Java?

Java uses curly braces {}, Python on the other hand uses indentation.

2. Object-oriented design

a.) What two parts does a class contain?
State and behaviour

b.) How are each of these parts represented?
State is represented by instance variables while behaviour is represented by methods.

c.) What do you call to create a new instance of a class (a new object)?
The class's constructor.

d.) What is the difference between a static and non-static method?
Static methods are declared in the class – also known as Class methods. They don't require an instance of the class to be called therefore cannot work on data associated with an object of the class.

Non-static methods are declared in the class – also known as object, member and instance methods. They can only be called on an instance of the class and can work on data associated with in object of the class.

e.) How do you call a static method?
returnVar = ClassName.methodName(parameters);

f.) How do you call a non-static method?
ClassName objectName = new ClassName();

returnVar = objectName.method();

3. Java identifiers

a). What are some of the ways in which an identifier will be illegal/not valid in Java? Describe three different ways.

Contains a space in the identifier. i.e. variable 1

Contains non-alphanumeric character such as &, ‘ and + i.e. O’Reilly

Identifier beginning with a numeric character i.e. 365days

4. Variable scope and for loop

Examine the segment of code in the box below.

```
public class Professor {

      private String name;
      private int age;

      public Professor(String n, int a) {
            name = n;
            age = a;
      }

      public void m1() {
            System.out.print(name + " is");
            for (int x = 0; x <= age; x++) {
                System.out.println(" " + x + ",")
            System.out.println(" years old");
      }

      public static void main(String[] args) {
            Professor p = new Professor("Professor X", 84);
            p.m1();
      }

}
```

a). What is the scope of the variable name?

The entire class.

b). What is the scope of the variable n?

Within the constructor method Professor(String n, int a).

c). What is the scope of the variable x?

Within the for loop.

d). What is he scope of the variable p?

Within the main().

5. Pre and post increment/decrement

What do you think the following code segment will output?

```
int a = 7;
int b = 9;
System.out.println(--a + b--); //15
System.out.println(a); //6
System.out.println(b); //8
int c = 5;
int d = 3;
System.out.println(c++ - ++d); //1
System.out.println(c); //6
System.out.println(d); //4
```

Explain why the code behaved in this way?

Pre increment/decrement i.e. ++a or --b means increment/decrement variable BEFORE evaluating the expression.

Post increment/decrement i.e. a-- or b++ means increment/decrement variable AFTER evaluating the expression.

6. Overloading

Examine the segment of code in the box

```
public class Area {
      public Area(String s, int a, int b){
            System.out.println(s + " " + a * b);
      }
      public Area(String s, int a) {
            System.out.println(s + " " + a * a);
      }
      public Area(int a) {
            System.out.println("Area " + a);
      }
...
}
```

a). What would be the result of the following line?

Area a1 = new Area("Area", 4 , 6);

Area 24

b). What would be the result of the following line?

Area a2 = new Area("Area", 7);

Area 49

c) What would be the result of the following line?

Area a3 = new Area(51);

Area 51

d) What would be the result of the following line?

Areaa4 = new Area("Area");

Compilation error

Exception in thread "main" java.lang.Error: Unresolved compilation problem: The Constructor Area(String) is undefined

7. Coding questions:

a.) Complete the following program that asks the user for the title of his/her favourite movie. Once the user enters the title of the movie the system prints out "Your favourite movie is [title]".

```
import java.util.Scanner;

public class Foo {

	public static void main(String[] args) {
		//TODO
		System.out.println("What is your favourite movie?");
		Scanner input = new Scanner (System.in);
		String title = input.nextLine();
		System.out.println("Your favourite movie is +
title);
	}

}
```

b.) Complete the following class by completing the following method getGrade() which when passed a percentage of type int, returns a grade as the String.

- A++ for 100%
- A for 80-99%
- B for 65-79%
- C for 50-64%
- D for 0-49%

The following skeleton code is provided on the next page:

```
public class Foo {

    public static void main(String[] args) {
        String grade= getGrade(100);
        System.out.println(grade);
    }

    public static String getGrade(int percentage){
        String grade = "";
        if (percentage<50){
            grade="D";
        } else if (percentage<65) {
            grade="C";
        } else if (percentage<80) {
            grade="B";
        } else if (percentage<100) {
            grade="A";
        } else {
            grade="A++";
        }
        return "Grade: " + grade;
    }

}
```

Test your code by passing the following different percentages:

Percentage:	**Grade:**
92	A
79	B

12	D
100	A++

c). Write a method named restaurantReview(int numberOfStars) that takes an int argument numberOfStars of a restaurant's rating as input. Using a switch statement if numberOfStars is 1 the method prints "This restaurant is terrible". If numberOfStars is 2 the method prints "This restaurant is not so good". If numberOfStars is 3 the method prints "This restaurant is so so". If numberOfStars is 4 the method prints "This restaurant is well worth a try". If numberOfStars is 5 the method prints "This restaurant is a must". Finally if the numberOfStars is of none of the above values the method prints "This restaurant has not yet been rated".

```
public class Restaurant {

	public static void main(String[] args) {
		restaurantReview(4);
	}

	public static void restaurantReview(int numberOfStars){
		switch (numberOfStars) {
			case 1:
				System.out.println("This restaurant is terrible");
				break;
			case 2:
				System.out.println("This restaurant is not so good");
				break;
			case 3:
				System.out.println("This restaurant is so so");
				break;
			case 4:
				System.out.println("This restaurant is well worth a try");
				break;
			case 5:
				System.out.println("This restaurant is a must");
				break;
			default:
				System.out.println("This restaurant has not yet been rated");
				break;
	}
}
```