Tutorial 4

You will be expected to engage with the tutor and discuss solutions to the problems presented here. The content covered in the tutorials will assist in your understanding of the practical requirements for the checkpoints.

1. For each of the following pairs, which represents a class and which represents an object of that class?

a. Superhero, Superman

b. Justin, Person

c. Rover, Pet

d. Magazine, Time

e. Christmas, Holiday

2. List some attributes and operations that might be defined for:

i. a class called `PictureFrame` that represents a picture frame.

ii. a class called `Meeting` that represents a business meeting.

iii. a class called `Topic` that represents a university topic (not a particular offering of a topic, just the topic in general).

3. Class Definitions and their Elements

i. What is the overall structure of a class definition? Identify the elements and explain what general role they play.

ii. What is *encapsulation* and what is *abstraction* and why are they important? How do classes provide support for them? What roles do visibility modifiers play?

iii. In what ways do instance, local and static variables differ?

iv. How does a *constructor* differ from a *method*? Are constructors mandatory in class definitions? How many constructors can there be for a single class?

4. Explain what we mean by the term visibility modifier? What are the different types of visibility modifiers that we can use in Java?

5. Explain the difference between *actual parameters* and *formal parameters*.

6. Write methods for the following scenarios

i. a method called `lyrics` that prints the lyrics of a song when invoked. The method should accept no parameters and return no value.

ii. a method called `cube` that accepts one integer parameter and returns that value raised to the third power.

iii. a method called `random100` that returns a random integer in the range of 1 to 100 (inclusive).

iv. a method called `randomInRange` that accepts two integer parameters representing a range. The method should return a random integer in the specified range (inclusive). Assume that the first parameter is less than the second.

v. Describe each step in the evaluation of the following method call, including the assignment of the formal parameter:

```
int y = 10 ;
System.out.println(take2(take2(y+1))) ;
```

given the following definition of `take2`:

```
int take2(int x) {
  System.out.println(x) ;
  return x-2 ;
}
```

What output is produced?

7. Write a class called `Dog` that contains instance data that represents the dog's `name` and `age`. Define the `Dog constructor` to accept and initialise the instance data. Include `getter` and `setter` methods for the `name` and `age`. Include a method to compute and return the age of the dog in 'person years' (seven times the dog's age). Include a `toString` method that returns a one-line description of the dog. Create a driver class called `Kennel` whose main method instantiates and updates several `Dog` objects.