



Vavuniya Campus of the University of Jaffna

First Examination in Information and

Communication Technology - 2016

First Semester - June/July 2017

ICT1172 Practical for Object Oriented Program Design

Answer All Questions

Time Allowed : Three hours

Instructions:

Create a folder on Desktop with your INDEX NUMBER as the FOLDER NAME. Save all your files in this folder.

1. (a) Implement a Java class Shape with the following properties:
 - i. Attributes (Private):
 - colour: String
 - filled: boolean
 - ii. Constructor:
 - A no-argument constructor that initializes the *colour* to "green" and *filled* to "true".
 - A constructor that initializes the *colour* and *filled* to the given values.
 - iii. Public Methods:
 - Getters and Setters for all the instance variables.

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- A `toString()` method that returns the colour of the shape and whether it has filled.

for example,

"A shape with colour green and not filled".

(b) Implement two subclasses of **Shape** called **Circle** and **Rectangle**

i. The **Circle** class contains:

- An instance variable *radius* of type double.
- Three constructors:
 - A no-argument constructor initializes the *radius* to 1.0.
 - A constructor initializes the *radius* to given value.
 - A constructor initializes the variables *radius*, *colour* and *filled*.
- Getter and Setter for the instance variable *radius*.
- Methods `getArea()` and `getPerimeter()` to return the area and the perimeter of the circle respectively.
- Override the `toString()` method inherited, to return "A Circle with radius=xxx, which is a subclass of yyy", where xxx is the value of the radius of the circle and yyy is the output of the `toString()` method from the super-class.

ii. The **Rectangle** class contains:

- Two instance variables *width* and *length* of type double.
- Three constructors:
 - A no-argument constructor initializes the *width* and *length* to 1.0.
 - A constructor initializes the *width* and *length* to given value.
 - A constructor initializes the variables *width*, *length*, *colour* and *filled*.
- Getter and Setter for all the instance variables.
- Methods `getArea()` and `getPerimeter()`.
- Override the `toString()` method inherited, to return "A Rectangle with width=xxx and length=yyy, which is a subclass of zzz", where xxx is the value of the width of the rectangle, yyy is the value of the length of the rectangle and zzz is the output of the `toString()` method from the super-class.

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`width=xxx` and `length=zzz`, which is a subclass of `yyy`", where `xxx` and `zzz` are the values of width and length of the rectangle respectively and `yyy` is the output of the `toString()` method from the superclass.

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(c) Write a class called `Square` as a subclass of `Rectangle`.

- `Square` has no instance variables, but inherits the super class instance variables `width` and `length`.
- Provide the appropriate constructors. (Hint: for a square `width = length`)
- Implement the methods `getSide()` and `setSide()` to get and set the length of the side respectively.
- Override the `toString()` method to return "A Square with side=`xxx`, which is a subclass of `yyy`", where `xxx` is the value of the length/width of the square and `yyy` is the output of the `toString()` method from the superclass.

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(d) Implement a `ShapeDemo` to test the above classes by including the following:

- Create the following objects using the values given below by reading them as keyboard input.
 - A `Shape` with the following values:
 - `colour = red`
 - `filled = true`
 - Two `Circles` with the following values:
 - `radius = 7.0`, `colour = red` and `filled = true`
 - `radius = 2.1`, `colour = blue` and `filled = false`
 - Two `Rectangles` with the following values:
 - `width = 20`, `length = 30`, `colour = red`, and `filled = true`
 - `width = 35.5`, `length = 45.6`, `colour = yellow` and `filled = false`
 - A `Square` with the following values:
 - `length = 50`, `colour = green` and `filled = true`

[40%]