Vavuniya Campus of the University of Jaffna

First Examination in Applied Mathematics and Computing - 2018

Second Semester - April/May 2020

CSC1213 Object Oriented Programming (Practical)

Answer All Questions

Time Allowed : Two hours

Instructions:

- Create a folder in the Desktop and name it with your Index number. Save all your files in the folder.
- Write the programs using Java programming language.

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1. Body Mass Index (BMI) is a measure of health based on weight and height. It can be calculated using the equation:

$$BMI = \frac{Weight(kg)}{Height^2(m^2)}$$

Write a Java program that prompts a user to enter weight in pounds and height in inches and then display the BMI.

Note that one pound is equal to 0.48359237 kilograms and one inch is equal to 0.0264 meters.

Also, your program should display a message as follows:

[To be continued...]

- Underweight: $BMI < 18.5$.
- Normal: $18.5 \leq BMI < 25$
- Overweight: $25 \leq BMI < 30$
- Obesity: $BMI \geq 30$

[30%]

2. (a) Write a class named **Circle** to represent a circle. The class should contains:
   - Two **private** data fields named **color** and **radius**. The **String** data field **color** specifies the color of the circle with default value **Red**. The **double** data field **radius** indicates the radius of the circle with default value **1.0**.
   - A no-arg constructor that creates a default **Circle**.
   - A constructor that creates a **Circle** with the specified **radius** value.
   - A constructor that creates a **Circle** with the specified **radius** and **color** values.
   - A method named **getRadius()** that returns the radius of the circle.
   - A method named **setRadius(double)** that sets the value for the radius of the circle .
   - A method named **getColor()** that returns the color of the circle.
   - A method named **setColor(String)** that sets the color for the circle .
   - A method named **getArea()** that returns the area of the circle.
     Note: Area of a circle with radius r is given by πr^2

   (b) Write a class named **Cylinder** that extends **Circle**. The class should contains:
   - A **private double** data field named as **height** to denote the height of the cylinder with default value **1.0**.
   - A no-arg constructor that creates a default **Cylinder**.
   - A constructor that creates a **Cylinder** with the specified **radius** value.

[To be continued...]

- A constructor that creates a **Cylinder** with the specified **radius** and **height** values.
- A constructor that creates a **Cylinder** with the specified **radius, height,** and **color** values.
- A method named **getHeight()** that returns the height of the cylinder.
- A method named **setHeight(double)** that sets the value for the height of the cylinder.
- A method named **getVolume()** that returns the volume of the cylinder using the area of the circle.

  Note: Volume of a cylinder with radius r and height h is given by $\pi r^2 h$
- A method named **display()** that displays the details of the **Cylinder**.

(c) Write a class named **Cone** that extends **Circle**. The class should contains:

- A **private double** data field named as **height** to denote the height of the cone with default value **1.0**.
- A no-arg constructor that creates a default **Cone**.
- A constructor that creates a **Cone** with the specified **radius** value.
- A constructor that creates a **Cone** with the specified **radius** and **height** values.
- A constructor that creates a **Cone** with the specified **radius, height** and **color** values.
- A method named **getHeight()** that returns the height of the cone.
- A method named **setHeight(double)** that sets the value for the height of the cone.
- A method named **getVolume()** that returns the volume of the cone using the area of the circle.

  Note: Volume of a cone with radius r and height h is given by $\frac{1}{3}\pi r^2 h$
- A method named **display()** that displays the details of the **Cone**.

[To be continued...]

(d) Create a class containing a main method named **myCircle** which should:

i. Creates two Cylinders, one Cylinder with default color, radius, and height and the other Cylinder with color **Blue**, radius **2.0**, and height **10.0**.

ii. Creates two Cones, one Cone with default color, radius, and height and the other Cone with color **Red**, radius **7.0**, and height **15.0**.

iii. Displays each of the above created object descriptions.

iv. Changes the values of second Cone; color **Red** to **Green** and radius **7.0** to **20.0** and displays the details of the cone. [70%]