

1) To help build software for a nutritionist's clinic, you are asked to create a class **Patient** with the following data members:

- **Name** a string of **variable** size (dynamically created). **Default** Empty String
- **Gender** a **constant value** of 1 character. Valid Values: "F" – "M". **Default**: "F"
- **Weight** The weight of the patient in Kg. Valid Values (3.5- 150). **Default**: 50.0.
- **Height** The height of the patient in meters. Valid Values (0.50-2.20). **Default**: 1.65.
- **Obesity_BMI** The value of BMI (Body Mass Index) over which the patient is considered to be obese. It should be of type float and **is shared among all objects of this class** .(For our patients is should be set to 30.0)

And the following member functions:

- A constructor with default arguments (**integrity checks required**).
- A **calculateBMI** function that calculates the **Body Mass Index** of the patient.
$$\text{BMI} = \text{weight in kilograms} / \text{height in meters}^2$$
- A **printPatientInfo** function to print on the screen all the information of a patient and prints "The patient is obese" if his BMI is greater than or equal to **Obesity_BMI** data member. **This function should have a cascading capability.**
- An **external** function **decrementWeight** that decrements the weight by a certain value, calculates the new BMI and print on the screen if the patient is still obese or not. This external function should be able to **access by name all members of your class**.

Write a program to test your class:

- Create 2 patients objects.
- Fill the objects created with different patients information.
- Test all written functions on these patients.

2)

2.1 - Design a **class point** that has **x** and **y** coordinates as data members:

Include the following member functions:

- Constructor with arguments
- Constructor without arguments (Default constructor)
- Scale function: **void scale(double a)**
This function is supposed to scale the coordinates of the point by **a**, i.e., multiply each by the real number **a**.
- Print function: **void print()**
This function is supposed to print a point on the screen in the format: [x,y]

- Distance function: **double distance(Point q)** .
This function should calculate and return the distance between 2 points.

The following formula gives the distance between two points (x1, y1) and (x2, y2) in the Cartesian plane:

$$\text{sqrt}((x2 - x1)^2 + (y2 - y1)^2)$$

It will be used as follows:

```
void main() {
    Point p(5,6);
    Point q(7,8);

    cout << p.distance(q) <<endl;    //calculates and print the
                                     // distance between p and q;
}
```

2.2 Using the class point, design the **class circle**.

In addition to the data member center which is of type point, include the data member radius (which is a real number).

Include the following functions:

- Constructor with arguments
- Constructor without arguments (Default constructor)
- **print** member function which displays the radius and the x and y coordinates of center
- **area** member function which returns the area of the circle
- **translate** member function which takes as input argument a point p and translates the center of the circle by p
- **contains** member function which takes as input argument a point p and checks whether or not p is inside the circle (*hint: the distance between the center and the point should be less than or equal to the radius*)

Write a program to test your classes and functions.

Submission

The following should be returned to the instructor in a folder:

1. A first page with your name, the assignment number.
2. Problem Description.
3. A listing of your programs (class and client program) **well documented**.
4. A screen capture of the output of your program.

Due date: Friday, November 23, 2012