Self Exercise for Week 3

Due March 11th at 3:00 p.m.

A. The Body Mass Index (BMI), devised between 1830 and 1850 by Adolphe Quetelet, is a measure for human body shape based on an individual's mass and height with the following formula:

$$\text{BMI} = \frac{\text{mass (kg)}}{\text{height}^2\ (m)}.$$

BMI values are statistically categorized as:

Category	BMI range
Very severely underweight	< 15
Severely underweight	15.0 ~ 16.0
Underweight	16.0 ~ 18.5
Normal	18.5 ~ 25
Overweight	25 ~ 30
Obese Class I (Moderately obese)	30 ~ 35
Obese Class II (Severely obese)	35 ~ 40
Obese Class III (Very severely obese)	>= 40

Farmer John wants to calculate BMIs for his family. Consider the following input file *file.in*:

```
170 68
160 85
162 43
167 80
192 58
0 0
```

There are multiple lines. Each line consists of two integers, representing height (in centimeter) and mass (in kilogram) for a family member of John. The input file ends up with two zeroes.

Write a C++ program to read in *file.in* and create a file *file.out* with the following format:

```
23.53 Normal
33.2 Obese Class I (Moderately Obese)
16.38 Underweight
28.69 Overweight
15.73 Severely underweight
```

For each line in *file.in*, each line in *file.out* consists of the calculated BMI value and its corresponding category. In your program, you need to design a class which records height and mass values as private data members. To manipulate these data members, you need to provide corresponding get and set functions. You also need to provide a public member function for returning the BMI value, and a public member function for returning the category (as a string).

B. Log in pd2.imslab.org, and execute the following command:
   $ **wget http://imslab.org/~tsaimh/course/1022_PD2/Makefile**
   to get the *Makefile* for sample code *timer7.cpp*, *timer7.h* and *main7.cpp* in lecture slides. Modify this file for your program in question A.

Deliverables

Your .zip file should include the following things:

1. A *.cpp* and a *.h* files for the BMI class.
2. A *.cpp* file for your main function.
3. A *file.in* file and a *file.out* file for testing. (You can copy the contents from question A or design it on your own.)
4. A *Makefile*.
5. A *README* file showing how to compile your program. (You can ignore it if your program can be compiled by a simple "make" command.)