CS382: Object Oriented Programming and Data Structures
Assignment I
Due Date: January 17, 2018
Indian Institute of Technology (IIT) Patna
Bihta, Patna, Bihar 801103, India.

Instructions. Students are advised to write their program with proper care. A program must have a header block consisting of programmer's name, roll no and date of creation. The objective of the program has to be written in the header block, also. The program should be properly indented and it is expected meaningful variable name. Use lowercase for variables and methods. If name consists of several words:

Make them into one

- First word lowercase
- Capitalize the first letter of each subsequent word
- Ex: radius, area and showMessageDialog

Capitalize the first letter of each word in a class name

- Ex: ComputeArea, System

Capitalize every first letter in a constant, and use underscores between words

- Ex: PI and MAX_VALUE

Problem I [5 marks]. One day, a tortoise and a hare decided to participate in a 20*meter* race. Tortoise can run at a speed of 0.9*meter* per minute and hare can run at the speed of 1.4*meter* per minute. After running for *X minutes* the hare decided to take rest for *Y minutes*. Tortoise never stopped during the race. Write a program in java which will take different values of *X* and *Y* and then determines the winner and also it computes the distance (in *meter*) between the winner and loser.

Problem II [5 marks]. Given integers *b* and *c*, compute *b/c* as an integer (rounded to the nearest integer). That is, round down if the remainder is less than 1/2, and up if the remainder is 1/2 or more. Write a program in java which will take different values of *b* and *c* and then determine the value of b^c and the rounded value of *b/c*.

Problem III [5 marks]. Body Mass Index (BMI) is a measure of health based on height and weight. It can be calculated by taking your weight in *kilograms* and dividing it by the square of your height in *meters*. The interpretation of BMI for people 20*years* or older is as follows:

BMI	Interpretation
Below 18.5	Underweight
18.5--24.9	Normal
25.0--29.9	Overweight
Above 30.0	Obese

Write a program in java which will take different values of height and weight and then calculate the BMI and corresponding interpretation.

Problem IV [5 marks]. Given a sorted integer array segment *b[h...k]* and an integer *x*, find the position j such that *b[h...j-1] ≤ x* and *b[j...k] > x*. (by *b[h...j-1] ≤ x*, we mean that all values of *b[h...j-1]* are ≤ x). Your program should run in time proportional to the logarithm of *k+1-h*.

Submission. Make a zip file: Assignment-I.zip. The file can contain your source program(s). You must upload the "Assignment-I.zip" file only.