**CS-224: Object Oriented Programming & Design Methodologies**

**Midterm Exam I– A- Fall 2017**

**Instructor: Ms. Asma Sanam Larik**

**Dated:** 20th Sept 2017 **Time:** 70 mins

**Q1.** A rational number is a number that can be represented as the ratio of two integers. For example, 2/3 is a rational number, and you can think of 7 as a rational number with an implicit 1 in the denominator. Design a class **Rational** that contains two integer variables to store the numerator and denominator of a rational number with the following functionality.

1. A constructor that takes no arguments and that sets the two instance variables to zero.
2. A method called **printRational** that takes a Rational object as an argument and prints it in some reasonable format.
3. A two argument constructor for initializing the instance variables.
4. A method called **toDouble** that converts the rational number to a double (floating-point number) and returns the result. Write a method named **reduce** that reduces a rational number to its lowest terms by finding the GCD of the numerator and denominator and then dividing top and bottom by the GCD.
5. Implement the method **main** that demonstrates all the above mentioned functionalities

**Q2.** During enrollment a student is free to take around 6 courses and each course contains an array of students enrolled in it. During add/drop week new students can come in and go such that the count of students changes. After add/ drop week no further addition/deletions are possible. You are required to implement a scenario before and after the enrollment. Create a separate array for student names before add/drop week and after the week crosses create a dynamic array to hold the updated names of students. Corresponding to each student hold the marks each student obtained in the first and the second midterm of the course. Your program is required to return the average marks stored by students in the two midterms.

**Q3.** Write a function named **rotate\_right** that takes as its arguments the following:

(1) an array of floating point values

(2) an integer that tells the number of cells in the array

The function should shift the contents of each cell one place to the right, except for the contents of the last cell, which should be moved into the cell with subscript 0 .

---------------------------------------------- Good Luck ☺-----------------------------------------