Computer Science Division
Department of Mathematics
Faculty of Science

Level 3- Fall Semester
Course Code: Comp 301
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Sheet 4

Objective: upon successful completion of this sheet, students should be able to deal with object arrays, `ArrayList` class, object exchanges, and String operations.

1. Design the "`Date`" class that contains the following data members and methods.

   Data members: day, month, and year.
   Methods:
   - suitable constructor(s);
   - compare two dates using the `equals()` method; and
   - display information about the date.

   Design also the "`Student`" class that contains the following data members and methods.

   Data members:
   - rolling number,
   - name,
   - birthDate,
   - maxDegree (which should be fixed for all subjects),
   - an array of degrees for `3` subjects (each of the `3` degrees has to be verified as being within the specified range),
   - an array of CGPAs for `5` semesters,
   - and a static variable named "count", which keeps track of the total number of enrolled students. The "count" variable can be used to set the value of the rolling number for each student.

   Methods:
   - suitable constructor(s);
   - calculate the grade of the student; and
   - display the student's information including the calculated grade.

Design also the "`StudentTest`" class that contains the following:
Data members: an array of students;
Methods: insert student's data, find the students with the highest total degree, and find the students who are on probation, which means their CGPA falls below `2` for TWO consecutive semesters.

2. Design the "`Car`" class that contains the following string data members: `carModel` and `carName`, a floating-point data member `carPrice`, and an integer data member `yearOfProduction`.
   The class should contain the appropriate constructors and methods to set and access the data members. The `toString()` method should also be overridden to show the car information.

   Design the "`CarTest`" class to test the `Car` class with a collection of cars using the `ArrayList` class. Test the equality of car objects, in terms of model and name. Replace all the BMW X5 cars with X6. Remove all TOYOTA cars whose production year is less than or equal `2012`.

3. Write Java programs utilizing string methods, each of which performs one of the following.

   - Check whether a string is palindrome or not.
   - Remove all leading whitespaces from a string.
   - Count the occurrences of a character in a string.
   - Remove duplicate characters from a string.
   - Display the words that appear more than twice in a string.
   - Get the third occurrences of a character in a string.
   - Determine the minimum and maximum occurring characters in a string.

4. Write Java programs utilizing string methods, each of which performs one of the following on an array of strings.

   - Find the string with the longest length.

- Find the most frequent string.
- Reverse the strings that have even lengths.
- Find the string with the maximum occurrence of a character.
- Count the strings that contain a specified file extension, assuming that the data stored in the array represents file names with extensions like “A.java”.
- Count the number of non-repeated characters of each string element in the original array and return the result as a two-dimensional array.