CSE 112 Butunleme

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I. Question (33 Points)

Design a class named **Complex** to represent complex numbers. The class contains:

- (2 pts) Two double fields real and imaginary that specify the real and imaginary parts of a complex number. The default values are 1.0 for real and 0.0 for imaginary part.
- (2 pts) A constructor that creates a fraction with the specified real and imaginary part.
- (4 pts) A method named Complex conjugate() that returns the complex conjugate of the complex number. The complex conjugate of a + bi is a - bi.
- (5 pts) A method named void add(Complex c) that adds the complex number c to the current complex number.
- (4 pts) A method named double absoluteValue() that returns the absolute value of the complex number. The absolute value of a + bi is $\sqrt{a^2 + b^2}$.
- (5 pts) A method named void multiply(Complex c) that multiplies the complex number c to the current complex number.
- (5 pts) A method that implements compareTo. Two complex numbers are compared as follows. First their real parts are compared. If they are equal, their imaginary parts are compared.
- (6 pts) A method that Complex[] readArray(String fileName) reads and returns an array of complex numbers from a file. An example file is as follows:

```
5
2.1 4.3
1.0 7.1
10.3 5.4
4.1 6.9
0.1 2.5
```

II. Question (36 Points)

- (4 pts) Design a class **Ogrenci** for a student having private fields; *no* no of the student, *name* name of the student, *surname* surname of the student and *gpa* gpa of the student.
- (6 pts) A method that implements compareTo for Ogrenci class. Two Ogrenci's are compared as follows. First their surnames are compared. If they are equal, their names are compared. Use **compareTo** method of strings to compare two strings.
- (2 pts) Design a class **Bolum** for a department having private fields; *students* array of students, *name* name of the department.
- (7 pts) Write a method void sort() (for the department class), which sorts the students in the department using the **compareTo** method.
- (2 pts) Design a class **Fakulte** for a faculty having private fields; *departments* array of departments of the faculty, *name* name of the faculty.
- (7 pts) Write a method int numberOfStudents(), which returns the number of students in the faculty.
- (8 pts) Write a method double averageGpa(), which returns the average of the gpa's of the students in the faculty.

III. Question (31 points)

Design a class named **Fraction** to represent rational numbers. The class contains:

- (2 pts) Two integer fields numerator and denominator that specify the numerator and denominator of a rational number. The default values are 1 for both.
- (2 pts) A constructor that creates a fraction with the specified numerator and denominator.
- (5 pts) A method named void add(Fraction f) that adds the fraction f to the current fraction.
- (3 pt) A method named void negate() that negates the fraction.
- (4 pts) A method named void inverse() that reverses the fraction (numerator becomes denominator, denominator becomes nominator).
- (4 pts) A method named void multiply(Fraction f) that multiplies the fraction f to the current fraction.
- (5 pts) A method that implements compareTo.
- (6 pts) A method that Fraction[] readArray(String fileName) reads and returns an array of fractions from a file. An example file is as follows:

```
5
2 4
1 7
10 6
4 6
1 2
```