CSE 301 Final Exam

I. Question (30 Points)

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

- 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.
- A no argument constructor that creates the default fraction.
- A constructor that creates a fraction with the specified real and imaginary part.
- A constructor that creates a fraction with the specified real part only (imaginary part is 0).
- The accessor and mutator (get and set methods) for two fields.
- A method named void print() that prints the complex number as a + bi where a is the real part and b is the imaginary part.
- A method named Complex conjugate() that returns the complex conjugate of the complex number. The complex conjugate of a + bi is a - bi.
- A method named void add(Complex c) that adds the complex number c to the current complex number.
- A method named double absoluteValue() that returns the absolute value of the complex number. The absolute value of a + bi is $\sqrt{a^2 + b^2}$.
- A method named void multiply(Complex c) that multiplies the complex number c to the current complex number.

II. Question (20 Points)

Design a class named **Person** and its two subclasses named **Student** and **Employee**. Make **Faculty** and **Staff** subclasses of Employee. A person has a name, phone number and email address. A student has a class status (freshman, sophomore, junior or senior). Define the status as a constant. An employee has an office, salary and date-hired. Define a class MyDate that contain the fields year, month and day. A faculty member has office hours and a rank. A staff member has a title. Implement also one constructor per class.

III. Question (30 Points)

- 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.
- Design a class **Bolum** for a department having private fields; *students* array of students, *name* name of the department.
- Write a method void sort() (for the department class), which sorts the students in the department according to their no's.
- Design a class **Fakulte** for a faculty having private fields; *departments* array of departments of the faculty, *name* name of the faculty.
- Write a method int numberOfStudents(), which returns the number of students in the faculty.
- Write a method double averageGpa(), which returns the average of the gpa's of the students in the faculty.

IV. Question (20 Points)

Write a main method in a class **Checkerboard** that reads two integers height and width from the user and displays a height$\times$width checkerboard on a frame.