

## CS390 Quiz1

1. (10 points) You are given fully implemented classes `Circle` and `Rectangle`. Each has a `computeArea` method, which returns the area of the figure according to the usual mathematical formulas. In the `DataMiner` class, a raw list is provided, named `objects`, and the main method calls `populateList` in order to populate this list with instances of `Rectangle` and `Circle`.

There is one unimplemented method in `DataMiner`: `computeAverageArea`. This method should compute the average area of the figures in the `objects` list.

For this problem you must implement `computeAverageArea` *using polymorphism*. This implies that your implementation *does not check* the runtime types of the figures in the `objects` list.

In order to set up the code so that you can use polymorphism, create a suitable interface that can be implemented by both `Rectangle` and `Circle`, and insert the appropriate type parameter in the declaration of the `objects` list. Then implement `computeAverageArea`.

For this problem, here are the steps of implementation you must complete:

- a. Define an appropriate interface, and make sure both `Rectangle` and `Circle` implement this interface. (You will get no credit if you do not use an interface.)
  - b. Implement the method `computeAverageArea`. The implementation of this method should use only one loop (if you use two loops or more, the solution is incorrect).
  - c. When you specify the type parameter for the `objects` list, you will need to change the type of the `temp` variable in the `swap` method.
2. (10 points) You are given fully implemented classes `Person` and `PersonWithJob`. `PersonWithJob` is a subclass of `Person`. Both `equals` methods have been provided. When you run main method from `Test` class, two `equals` tests yield different outputs – one is true and other one is false.

For this problem, here are steps of implementation you must complete:

- a. Rewrite the inheritance relationship between `Person` and `PersonWithJob` to composition. You must need to modify code necessary for this change so that there are no compiler errors.
- b. The main method from `Test` class also tries to output the objects to the console, but unfortunately it is not readable. Output provided below –  
    `week2.Person@2a33fae0`  
    `week2.PersonWithJob@707f7052`

Provide a readable representation of the objects and output to the console. For example, for `Person` objects, the name field should be formatted and outputted. For `PersonWithJob`, both the name and salary fields should be formatted and outputted.