Name and, if possible, ID#: _____

AMERICAN UNIVERSITY OF ARMENIA
College of Science and Engineering
COMP120 Introduction to Object-Oriented Programming

FINAL EXAM

1/15

Date:	Monday, May 18 2015
Starting time:	09:20
Duration:	1 hour 40 minutes
Attention:	**ANY TYPE OF COMMUNICATION IS PROHIBITED**

Please write down your name at the top of all used pages

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Problem 1

Consider below a ***public interface Valuable*** that includes the only method ***public double value(double x)***:

```
public interface Valuable {

      public double value(double x);
}
```

1.1 Implement a ***public class Function*** that encapsulates a member variable of type ***Valuable*** and computes its max in the specified range from x_1 to x_2 by looking at:

$f(x_1), f(x_1+dx), f(x_1+2dx), \ldots, f(x_1+k*dx)$, where $k = 1, 2, \ldots$ and $x_1+k*dx < x_2$

```
public class Function {

      private Valuable f;
      private double dx;

      public Function(Valuable newValuable, double newDX) {
            //TO BE IMPLEMENTED for(int c=0; Function(Valuable + c·dx) < Function(
      }        f = newValuable(new Valuable);
               dx = newDX;
      public double max(double x1, double x2) {
            //TO BE IMPLEMENTED for(int c=0; Function(x1 + c·dx) < Function(x2))
      }                          return c;
```

1.2 Implement an expression

$$a * sin(x) + b * cos(x)$$

as a ***public class Harmonic*** that implements the interface ***Valuable*** and encapsulates double parameters ***a*** and ***b***. The parameters are initialized by the two-argument constructor ***public Harmonic(double newA, double newB)***;

1.3 In a separate ***public static void main(String args[])*** write a code that inputs two double values, creates an object of type ***Harmonic*** and, using the class ***Function***, prints its maximal value in the range from $x_1 = -1.5$ to $x_1 = 1.5$:

```
public static void main(String args[]) {
      Scanner input = new Scanner(System.in);
      double a = input.nextDouble(), b = input.nextDouble();

      //TO BE COMPLETED

}
public class Harmonic(double newA, double newB) {
   return newA·sin(x) + newB·cos(x);
```

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Use the backside, if needed

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