EECS 1510: Object Oriented Programming

Project 5 – Methods, Arrays, and Strings

160 Points Due in class Thursday March 30, 2017

Submission Procedure. For the programs 1 and 2, print ***two*** sample runs, one using the values from a sample dialog below, the other using values from some "special" case.

Grading: You are not required to use the program standards for Project 5. However, projects of high quality will be awarded 10 to 20 points extra credit

Program 1 (40 points) BinaryConversion.java

Consider the following dialog:

```
Enter a binary number: 1110
Conversion to decimal:  14
Enter a binary number: 10010000
Conversion to decimal:  144
Enter a binary number: -1
All set !
```

Write the application implied above. In particular, the program will read a sequence of binary strings and convert each one to a decimal integer. The program will terminate when the string -1 is given. You must do the conversion by hand, and NOT use the predefined functions in Java for the wrapper class Integer.

You must use a function for the conversion to decimal, where the parameter to the function is the binary string, and the return value is the equivalent decimal integer.

```
public static int binaryToDecimal (String binaryString)
```

Program 2 (30 points) Valid Phone Numbers

Phone number can have one of several valid formats: In particular, strings like

```
419-460-1212      (419)460-1212      460-1212
```

are valid but strings like

```
419-460      (419)460-a321      46012-12
```

are not. Write a program to read in a string and check whether it has the format

```
ddd-ddd-dddd
```

where each d is a digit.

Program 3 (90 points) FastestRunner.java

A group of 16 students decided to run in the Columbus Marathon. Their names and times (in minutes) are below:

Name	Time (minutes)
Elena	341
Thomas	273
Hamilton	278
Suzie	329

Phil	445
Matt	402
Alex	388
Emma	275
John	243
James	334
Jane	412
Emily	393
Daniel	299
Neda	343
Aaron	317
Kate	265

Find the fastest and the second fastest runner.

In particular, write a program as follows.Print the list of runners and times as above. Then print the name of the fastest runner and his/her time (in hours and minutes). Also, find the second fastest runner. Print the name and his/her time (in hours and minutes).

The program should have a method that takes as input an array of integers and returns the index corresponding to the person with the lowest time. The program should apply this method to the array of running times to find the fastest runner.

Also include a second method to find the second-best runner. The second method should use the first method to determine the best runner, and then returns the index corresponding to the person with the second lowest time.

Extra Credit (10 points): Print the list of runners and times nicely formatted in columns as displayed above. One option is to use the ***`printf()`*** method.

Here is some program code to get started:

```
class Marathon {
public static void main (String[] arguments){
  final int numRunners = 16;
  String[] names ={"Elena", "Thomas", "Hamilton", "Suzie", "Phil", "Matt",
    "Alex", "Emma", "John", "James", "Jane", "Emily", "Daniel",
    "Neda","Aaron", "Kate"};

  int[] times ={341, 273, 278, 329, 445, 402, 388, 275, 243, 334, 412,
    393, 299,343, 317, 265};
  . . .

  for (int i = 0; i < numRunners; i++) {
    System.out.println(names[i]+ ": " + times[i]);
  }

  . . .
```