FPP Mock Programming Test 1

Student Id: ____________________ Name: ______________________

For the following questions, write your algo in steps first before turning them into Java code. Once you are done, test your code and make sure it works.

1. Create a Java method

   ```
   static int[][] chop(int[] arrayOfInts)
   ```

   in a class Prog1 that outputs a 2d array of `int`s. For example, given an array

   ```
   [2, -5, -21, 3, 8, 18, 45, 0, 12, 18, 6, 3, 1, 0, -22]
   ```

   You should return the following arrays:
   Everyone of them being sorted in either ascending or descending order.
   [2, -5, -21], [-21, 3, 8, 18, 45], [45, 0], [0, 12, 18], [18, 6, 3, 1, 0, -22]
   Let's assume these boundary values (highlighted in yellow) do not repeat as you see below

   ```
   [2, -5, -21,-21, -21, 3, 8, 18, 45, 45, 0, 12, 18, 18, 18,
   6, 3, 1, 0, -22]
   ```

   Algo description (we assume that the length of input array is greater than 2):

   - Mark your start positions of the first two elements as pos1 and pos2;
   - Compare the 2 elements to know their ordering type: ascending or descending;
   - Check whether the element at (pos2+1) would change the ordering type;
     - If no, increment pos2 by 1 and continue checking element at (pos2+1) on a potential change of ordering;
     - If yes, create a new array of size (pos2-pos1+1) that contains all elements between pos2 and pos1 from the input array. Then save this new array as an element of a 2D array or a List.
   - Now let pos1 = pos2 and pos2 = pos2+1. Repeat the above process until you have iterated through all elements in the input array.
   - Return the 2D array. If you choose to use a List to store all newly created arrays, turn this list to a 2D array first.
   - Note that in Java, when you create an array, you need to specify its size at the time of creation. So that is why I consider using a List instead of a 2D array, because at the time of creating this 2D array, we do not know its size.

2. Create a Java method

   ```
   static double slope(int[] arrayOfInts)
   ```

   in a class Prog2 that outputs slope = (max-min)/(index1-index2)

   Let’s say max = max(`arrayOfInts`), min = min(`arrayOfInts`)
   index1 = index of max in `arrayOfInts`, index2 = index of min in `arrayOfInts`

   For example, with the given array

   ```
       [2, -5, -21, 3, 8, 18, 45, 0, 12, 18, 6, 3, 1, 0, -22]
   ```

   You should return (45 - (-22))/ (6-14) = -67/8 = -8.375
   All necessary methods have to be written by yourself. Do not use an existing class library to find max, min, index, etc. To make things simpler, let’s assume that max and min are unique in any given array.