

CMSC 113 – COMPUTER SCIENCE 1

Lab#4 1-Dimensional Arrays – Practice – Submit completed form in dropbox by due date.

In this lab you will practice instances where arrays are used to do some typical computations.

Task # 1: Review: The following table contains some typical examples of using arrays. Assume that the array `a[]` is an array of `n` double values. Please spend a few minutes, preferably with the person sitting next to you, to get a good understanding of arrays. Please, ask your instructor in case you need any clarification. Before you study the table below, declare and create the array `a[]` below:

<i>create an array with random values</i>	<pre>Double[] a = new double[n]; for (int i = 0; i < n; i++) a[i] = Math.random();</pre>
<i>print the array values, one per line</i>	<pre>for (int i = 0; i < n; i++) { System.out.println(a[i]); }</pre>
<i>find the maximum of the array values</i>	<pre>double max = Double.NEGATIVE_INFINITY; for (int i = 0; i < n; i++) { if (a[i] > max) max = a[i]; }</pre>
<i>compute the average of the array values</i>	<pre>double sum = 0.0; for (int i = 0; i < n; i++) sum = sum + a[i]; double average = sum / n;</pre>
<i>Reverse the values within an array</i>	<pre>for (int i = 0; i < n/2; i++) { double temp = a[i]; a[i] = a[n-1-i]; a[n-1-i] = temp; }</pre>

Task#2: Write and run a program that declares, creates, and initializes an array `a[]` of length 1000 with all zeros. Then, write a command following the initialization to print out the value in `a[1000]`.

Does your program compile?

What happens when you run it?

Task#4: Hand trace the following code and show the contents of the array, **a[]** after the for-loop has terminated:

```
int n = 10;
int[] a = new int[n];
a[0] = 1;
a[1] = 1;
for (int i=2; i < n; i++)
    a[i] = a[i-1] + a[i-2];
```

Contents of a[] will be:

Your instructor will confirm the answer when you submit the lab in dropbox.

Task#3: Sampling without replacement

The program below takes two command line arguments **m** and **n** and produces a sample of **m** integers from 0..n-1. Enter, run, and test the output of the program for values (m, n) = (5, 10), (5, 1000).

```
public class Sample {
    public static void main(String[] args) {
        int m = Integer.parseInt(args[0]);
        int n = Integer.parseInt(args[1]);
        int[] a = new int[n];

        // Initialize a[]
        for (int j = 0; j < n; j++)
            a[j] = j;

        // Shuffle the first m elements of the array
        for (int i = 0; i < m; i++) {
            int r = i + (int) (Math.random() * (n - i));
            int t = a[r];
            a[r] = a[i];
            a[i] = t;
        }

        // Print sample
        for (int i = 0; i < m; i++)
            System.out.print(a[i]) + " ";
        System.out.println();
    } // main()
} // class Sample
```

Run the program for (10, 10) and (10, 5) and write down the output of the program below. Can you explain the results?