

**Engr 123**  
**Programming Assignment 5**  
**Statistical properties**

**Assigned: February 20, 2017**  
**Due: March 13, 2017**

Reminder: This is a programming project, and work on this assignment should be done individually. Assistance from other students is limited to questions about specific issues as noted in the syllabus.

This assignment will be done as a Windows Forms application. You will need to get input from the user by way of three text boxes which includes a minimum (min), a maximum (max), and the number of integers (num). Your program should generate num random integers on the interval  $\min \leq x \leq \max$  and store these integers in an array. After the numbers are generated by your program the user should be able to click on one of eight radio buttons listed as: 1)Sum, 2)Average, 3)Median, 4)Standard Deviation, 5)Maximum, 6)Minimum, 7)Root Mean Square value, or 8)Number of time x appears. Each time the user selects a radio button your program should do the appropriate calculation and display the result and a text box with appropriate comments.

Notes:

- For item 3, the median you will need to sort the array and display the middle value. You can use the bubble sort on the following page to sort your array.

- The standard deviation in item 4 is given by

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2} \quad \text{where} \quad \mu = \frac{1}{N} \sum_{i=1}^N x_i \quad (\text{the average})$$

- For item 7 the root mean square value is the square root of the average of the squared values or:

$$rms = \sqrt{\frac{1}{N} \sum_{i=1}^N x_i^2}$$

- You will need an additional text box to allow a value for  $x$  for item 8.

After you get your program running correctly, right click on the *project folder* and choose Send To → Compressed zip file. Rename the compressed zip file as Asn05XXX.zip where XXX are your three initials. Upload the renamed file to <\\cecsfp01\users\everyone\engr123>.

```
private void BubbleSort(int [] data)
{int i;
bool fDone;
fDone = false;
while(!fDone)
    {fDone = true;
    for(i=0;i<data.Length-1;i++)
        {if(data[i] > data[i+1])
            {Swap(ref data[i], ref data[i+1]);
            fDone = false;
            }
        }
    }
}

private void Swap(ref int a, ref int b)
{int tmp;
tmp = a;
a = b;
b = tmp;
}
```