Pseudocode for Statistics:

1. Formula for mean and standard deviation:
   * Mean: ((x1 + x2 + x3 + xn……) / n) where x is the next item in the array until n items
   * Standard Deviation: Square root((x1 – mean)^2 + (x2 – mean)^2 + (x3 – mean)^2 + (xn – mean)^2) / (n – 1) where x is the next item in the array until n items
2. Declare non-constant variables
   * numbers as an empty double array of size 10
   * total to store sum of all numbers
   * mean to store the mean calculated later
   * standardDeviationPart1 to store the first part of the standard deviation before the division of n – 1
   * standardDeviation to hold the answer
3. Make a look that goes on until it’s happened n times (in context of the size of the numbers array), where current iteration is called i. Do this in the loop:
   * Prompt the user for a number
   * Record that number in numbers[i].
   * Add the recorded number into total
4. Calculate the mean by doing the total / n (in context of the size of the numbers array)
5. Loop through array again and add that into the standardDeviationPart1 by doing:
   * Add (currentNumber – mean) ^ 2 into standardDeviationPart1 until there’s no more numbers
6. Calculate the standardDeviation by dividing the first part by n – 1.
7. Show the user the mean and standard deviation

Flowchart for Statistics:

A close up of a map

Description automatically generated

Test Cases for Statistics

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Case # | Input | Expected Output | Actual Output | Did it pass? |
| Case 1 | 1  2  3  4  5  6  7  8  9  10 | The mean is 5.5  The standard deviation is 3.0276503540975 | The mean is 5.5  The standard deviation is 3.0276503540974917 | Y |
| Case 2 | 10  11  12  13  14  15  16  17  18  19 | The mean is 14.5  The standard deviation is 3.0276503540975 | The mean is 14.5  The standard deviation is 3.0276503540974917 | Y |
| Case 3 | 2  4  6  8  10  12  14  16  18  20 | The mean is 11.0  The standard deviation is 6.0553007081945 | The mean is 11.0  The standard deviation is 6.0553007081949835 | Y |
| Case 4 | 16  24  25  33  42  47  49  68  76  83 | The mean is 46.3  The standard deviation is 23.026795984968 | The mean is 46.3  The standard deviation is 23.02679598496789 | Y |

Screenshots for test cases

Case 1:

A screenshot of a social media post

Description automatically generated

Case 2:

A screenshot of a social media post

Description automatically generated

Case 3:

A screenshot of a cell phone

Description automatically generated

Case 4:

A screenshot of a cell phone

Description automatically generated

UML Diagram for Statistics

A screenshot of a cell phone

Description automatically generated

Lessons Learned:

I learned how to iterate through arrays with 2 different kinds of loops. I also learned about 2 other loops that I could have used. I didn’t use them because I felt like these loops were the best that could be used. I learned the importance of not doing calculations in a loop. When I first wrote the program, I was getting wrong results because the calculations for the standardDeviationPart1 was not being calculated correctly. I was calculating the mean on the fly as well as the standard deviation. So in the end, I ended up getting (x1 – meanwith1item)^2 + (x2 – meanwith2items)^2 + (xn – meanwithnitems) instead of with the mean of the total.

**Check List**

|  |  |  |  |
| --- | --- | --- | --- |
| **#** |  | **Y/N** | **Comments** |
|  | **Source java files** | **Y** |  |
|  | **Compressed files:** | **Y** |  |
|  | FirstInitialLastName\_Project3\_Moss.zip | **Y** |  |
|  | FirstInitialLastName\_Project3\_doc.zip | **Y** |  |
|  | **Program compiles** | **Y** |  |
|  | **Program runs** | **Y** |  |
|  | **Checklist is completed and included in the Documentation** | **Y** |  |
|  | **Documentation file:** | **Y** |  |
|  | **Comprehensive Test Plan** | **Y** |  |
|  | **Screenshots based on Test Plan** | **Y** |  |
|  | **UML Diagram** | **Y** |  |
|  | **Algorithms/Pseudocode** | **Y** |  |
|  | **Flowchart** | **Y** |  |
|  | **Lessons Learned** | **Y** |  |