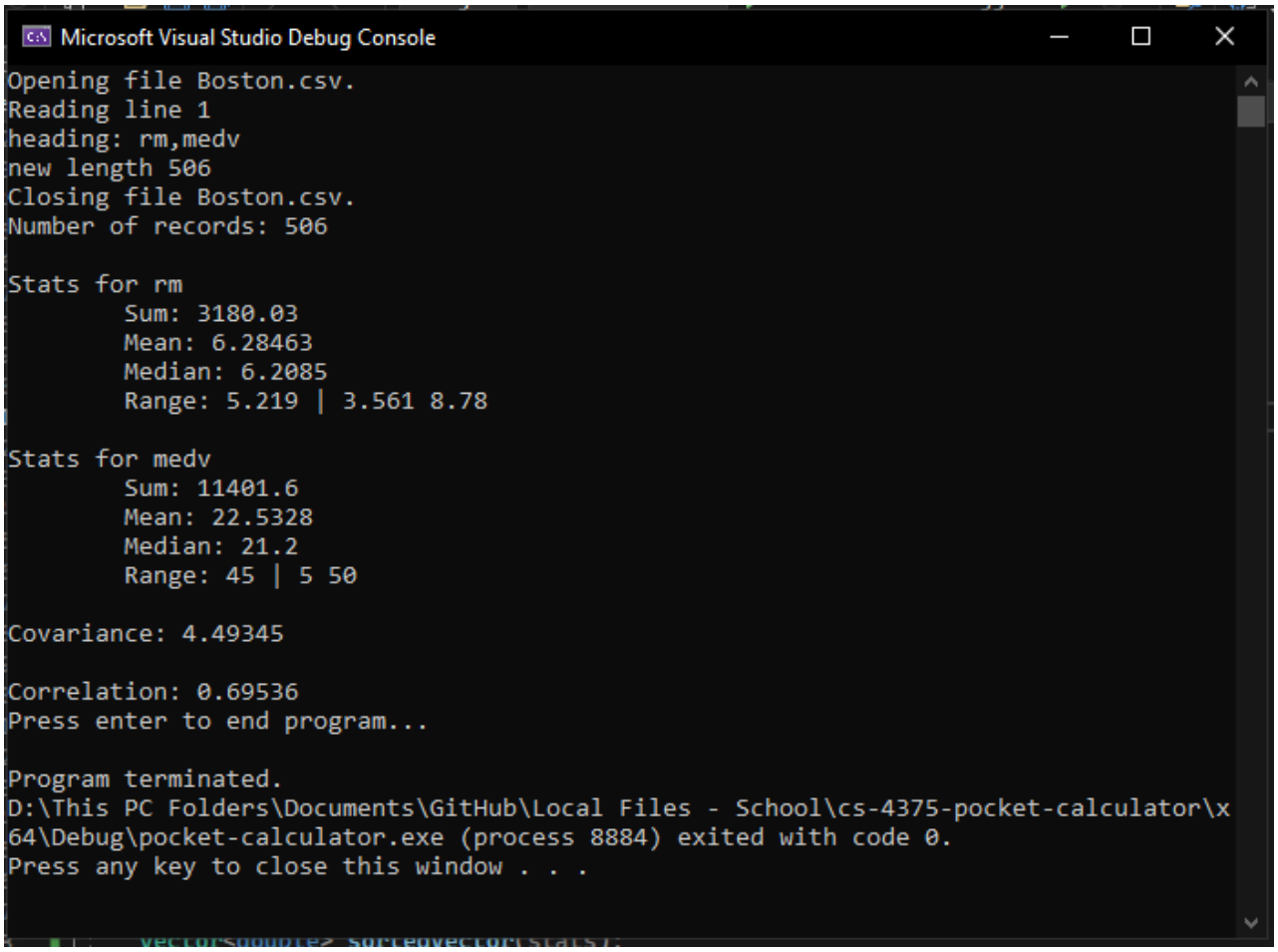
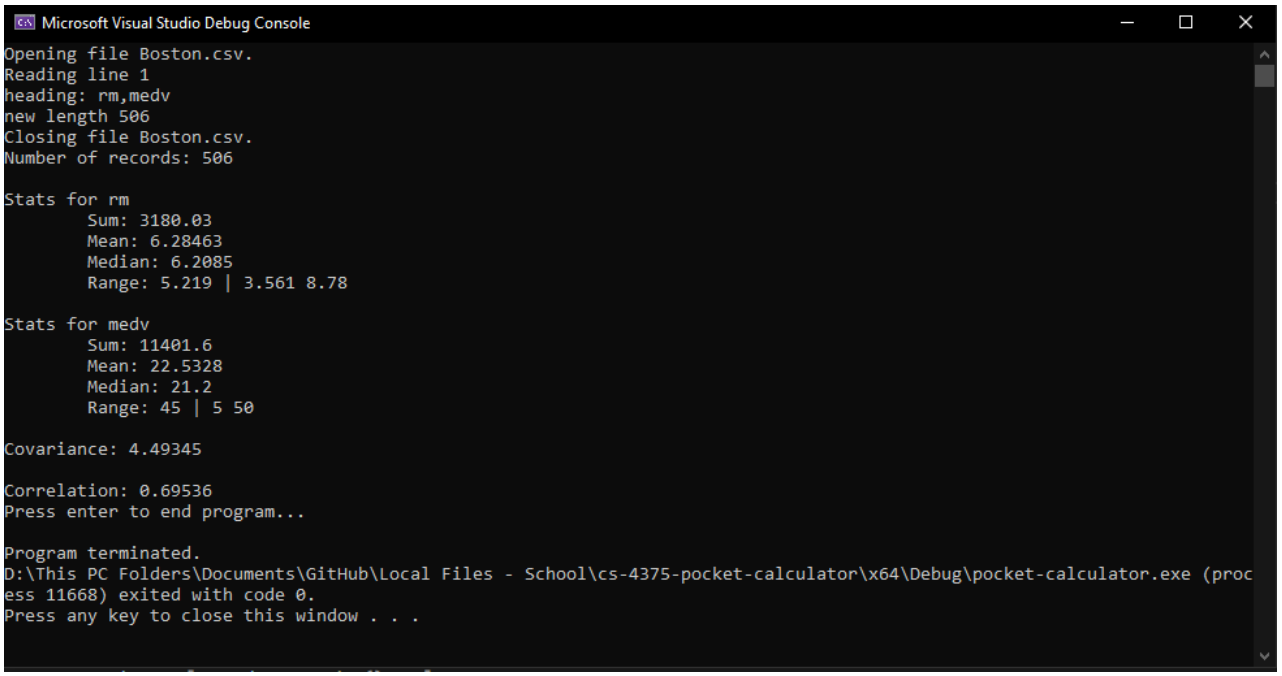
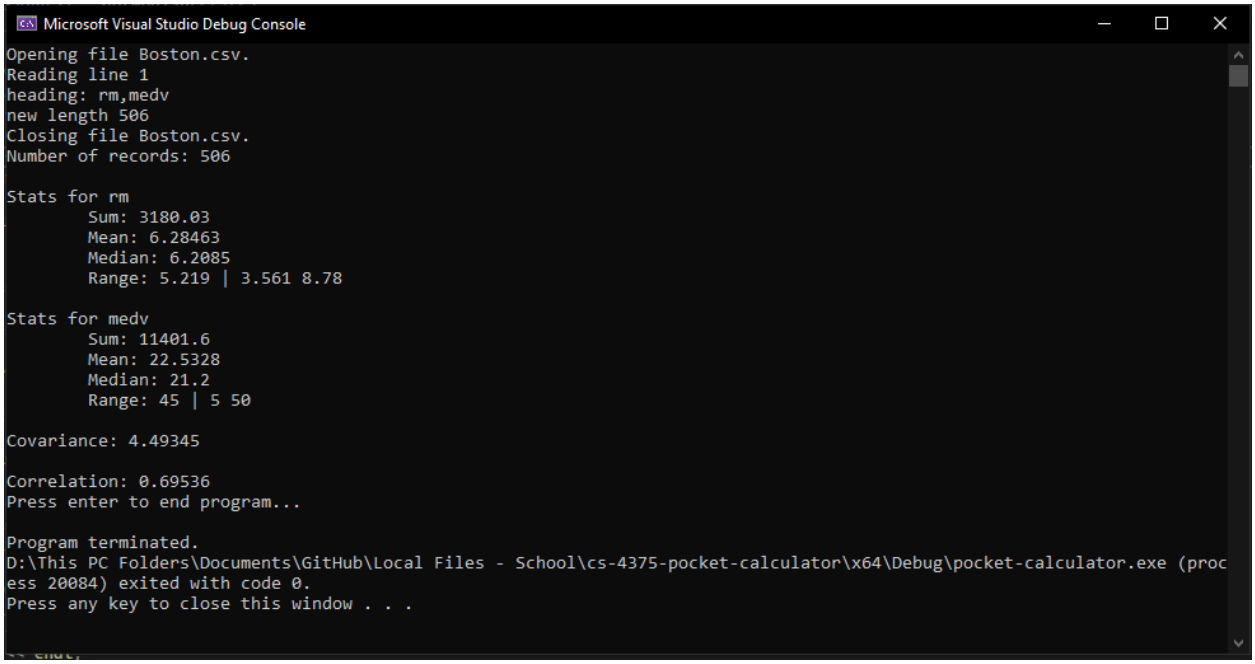
1. Runs of my code appear on pages 3 and 4. This is from inside of Microsoft Visual Studio, but you can run the executable (Boston.csv must be in the same folder) and you will get similar output, but the “Program Terminated” and the exit message will be cut off since the program exits.
2. The experience of having to make the functions rather than using built in functions is certainly more difficult and time consuming. I believe that it took me a total of three hours to get the C++ code to work due to my insistence that it returns an array of the data, while the R code took me no more than five minutes to type everything up and get it into pdf form. I like that R has these built in functions, but there is a lack of control that I feel with it as well as some unfamiliarity.
3. Mean is the average of all of the numbers in a (in this case) vector, meaning summing all of the numbers and dividing it by the size of the vector. The median is the ‘middle’ number where the vector is sorted and returns the middle number. The middle number is a position of half the size of the vector where if the vector is even, the two middle most numbers are averaged to return the median. Range in my program shows the difference between the largest number in the vector and the smallest number, but I included the smallest and largest number after the difference. These numbers are helpful because they can all determine what is most “average” on a data set. The mean provides the literal average, the median provides an average with less bias to outliers, and the range shows just how wide the data set can be by showing its furthest outliers. This is all important information to understanding a data set and it is very helpful for determining what statistics to use when designing algorithms for those data sets.
4. Covariance describes the relationship between two variables and how much those two variables relate to each other. The number is not on a regular scale, but the larger it is, the more the two variables are related. The most important function of this is to determine the correlation of the two vectors. Correlation is a scale of -1 to 1 where a -1

signifies a strong negative relationship and a 1 signifies a strong positive relationship. 0 indicates the lowest amount of correlation a variable can have. This tells us how closely the two data sets are related, and gives us a number on a regular scale to determine if they have a relationship or if they do not. Correlation is much more important (but covariance is still important because you need it to determine correlation) because it allows a data scientist/programmer to determine the reliability of predicting data using this data set's line of best fit.

5.


Microsoft Visual Studio Debug Console
Opening file Boston.csv.
Reading line 1
heading: rm,medv
new length 506
Closing file Boston.csv.
Number of records: 506
Stats for rm
Sum: 3180.03
Mean: 6.28463
Median: 6.2085
Range: 5.219 | 3.561 8.78
Stats for medv
Sum: 11401.6
Mean: 22.5328
Median: 21.2
Range: 45 | 5 50
Covariance: 4.49345
Correlation: 0.69536
Press enter to end program...
Program terminated.
D:\This PC Folders\Documents\GitHub\Local Files - School\cs-4375-pocket-calculator\x64\Debug\pocket-calculator.exe (process 8884) exited with code 0.
Press any key to close this window . . .


Microsoft Visual Studio Debug Console
Opening file Boston.csv.
Reading line 1
heading: rm,medv
new length 506
Closing file Boston.csv.
Number of records: 506
Stats for rm
Sum: 3180.03
Mean: 6.28463
Median: 6.2085
Range: 5.219 | 3.561 8.78
Stats for medv
Sum: 11401.6
Mean: 22.5328
Median: 21.2
Range: 45 | 5 50
Covariance: 4.49345
Correlation: 0.69536
Press enter to end program...
Program terminated.
D:\This PC Folders\Documents\GitHub\Local Files - School\cs-4375-pocket-calculator\x64\Debug\pocket-calculator.exe (process 11668) exited with code 0.
Press any key to close this window . . .


Microsoft Visual Studio Debug Console
Opening file Boston.csv.
Reading line 1
heading: rm,medv
new length 506
Closing file Boston.csv.
Number of records: 506
Stats for rm
Sum: 3180.03
Mean: 6.28463
Median: 6.2085
Range: 5.219 | 3.561 8.78
Stats for medv
Sum: 11401.6
Mean: 22.5328
Median: 21.2
Range: 45 | 5 50
Covariance: 4.49345
Correlation: 0.69536
Press enter to end program...
Program terminated.
D:\This PC Folders\Documents\GitHub\Local Files - School\cs-4375-pocket-calculator\x64\Debug\pocket-calculator.exe (proc
ess 20084) exited with code 0.
Press any key to close this window . . .