Homework 10: Median

Assigned: Wednesday 08 May
Due Date: Wednesday 15 May *May be a day or two late due to the final exam.*

Objectives

More practice working with arrays.

Assignment

This assignment is a continuation of Classwork 10. (NOTE: You must still submit Classwork 10 and Homework 10 separately.) For this homework assignment, embellish your program from Classwork 10 by also printing out the number of scores and calculating the median score.

Recall that the median of a sequence of numbers, $\{x_1, x_2, \ldots, x_n\}$, is the value x such that half of the numbers are less than or equal to x and half of the numbers are greater than or equal to x (NOTE: If there are an even number of values, then two values might be considered the median. Just report one of these two values, do NOT take the average). For example, the median of $\{1, 7, 2, 2, 4, 2, 9, 3, 7\}$ is 3 because 4 values (1, 2, 2, 2) are less than 3 and 4 values (7, 4, 9, 7) are greater than 3.

Example Compilation and Execution

```
[arsenaul@linux1 hw10]$ gcc -Wall median.c
[arsenaul@linux1 hw10]$ ./a.out < hw10test1.txt
The number of scores is 21.
The average score is: 13.047619
count[0] is 0.
count[1] is 1.
count[2] is 2.
count[3] is 0.
count[4] is 0.
count[5] is 0.
count[6] is 0.
count[7] is 1.
count[8] is 1.
count[9] is 1.
count[10] is 0.
count[11] is 1.
count[12] is 2.
count[13] is 1.
count[14] is 0.
count[15] is 1.
count[16] is 2.
count[17] is 2.
count[18] is 1.
```

```
count[19] is 2.
count[20] is 3.
The mode of the scores is 20. It occurred 3 times.
The median score is 15.
[arsenaul@linux1 hw10]$
```

Notes

- Make a **copy** of your program from Classwork 10.

  ```
  [arsenaul@linux1 ~]$ cp ~/cs104/cw10/mode.c ~/cs104/hw10/median.c
  ```

- Two input files have been prepared for you: "hw10test1.txt" and "hw10test2.txt". The first one is a small file with only 21 numbers that is useful for testing while you develop your program. The second file has 999 numbers.
  - hw10test1.txt
  - hw10test2.txt
- It is useful to print out n just for debugging/development purposes.
- Think about how to calculate the median. You already have the `count[]` array computed. If you iterate through the `count[]` array, you should be able to determine when half of the scores have been encountered. Then you have the median. Do this by hand on a small example first.

Grading Rubric

- Header comment: 2 points
- Body comments: 3 points
- Compiles: 35 points
- Prints number of scores: 5 points
- Prints average correctly: 5 points
- Prints out the scores correctly: 5 points
- Finds mode: 5 points
- Finds median correctly: 40 points

What to Submit

Use the `script` command to record yourself compiling and running your programs 3 times, using different numbers each time. (Do not record yourself editing your program!) Exit from `script`. Submit your programs and the typescript file.

```
[arsenaul@linux1 hw10]$ submit cmsc104_arsenaul hw10 median.c typescript
```

Verify

Make sure you submitted the assignment correctly.

```
[arsenaul@linux1 hw10]$ submitls cmsc104_arsenaul hw10
```