

Handout 13

Mean, median, mode, etc.

Suppose we have a list of numbers.

- The *mean* of the list is the average of the numbers.
- The *median* is the value such that half of the numbers are greater and half are less than. The median should split the difference between the nearest two values on the list.
- The *mode* is the value occurring the most often. (In the case of a “tie” we say that there is not a single mode.)

In this handout we work towards computing the mean, median, and mode of a list of numbers.

13.1 Setup

Write a piece of code called `list.c` that uses a `for` loop to take in a list of 10 integers, storing them in an array. When doing this, create a variable called `size` that is the number of items in the list. Set `size=10` for now. We want to be able to easily modify our code to handle lists of other sizes by simply changing the value of `size`. Thus whenever referencing the size of the list, always refer to variable `size` and never directly to the number 10.

13.2 Mean

Add a loop to your code that computes the mean of the list of numbers.

13.3 Putting the data in order

- Add a `for` loop that goes through the array and finds the index corresponding to the smallest number. Print out a statement of the form

```
Item number ??? is smallest. It has a value of ???.
```

- Modify this loop so that it swaps the first item in the list with the smallest value. Then print out the list so that you can see that things worked.
- Now create a second loop that finds the second-smallest value. (Important question: Where does this second loop need to start?) Construct this loop so that it swaps the second-smallest value with the second number in the list. Print out the list to see that things have worked as you hoped.
- Combine the two loops in to one master nested loop that swaps the first item with the first-smallest value, the second item with the second-smallest, etc. At the end of this process the numbers should be in order. Print out the list to make sure that things are working as they should.

13.4 Median

Now that the list of inputs has been sorted, you can find the median value.

13.5 Challenge: mode

Find the mode of the list of numbers.

13.6 Lab: mean-median-mode.c

Write a program that takes in 100 integers and returns the mean, the median, and – if you accept the challenge – the mode (if it exists).

If your code only finds median and mode, then the output should look like this:

```
mean = ???
median = ???
```

If your code also finds the mode, then the output should either look like this

```
mean = ???
median = ???
mode = ??? (occurs ??? times)
```

or this

```
mean = ???
median = ???
mode does not exist
```

Note: Successful computation of the mean and median results in a grade of 3.0. Additional successful computation of the mode results in a grade of 4.0.