Computer Science I Bill Griffith PhD

HW6 16 pts (4 for style) **Due Thursday, October 24, 11:59 PM**

As part of the quality control program at American Widget Company, a random number (between 20 and 30) of widgets are selected at random from the production line each day and tested. During the tests each of the widgets is assigned an integer score from 1 (falls apart at the touch) to 10 (perfect).

Write a Python program that allows the user to input the list of scores and then computes the mean, median, mode, and, standard deviation. You must create four functions to produce those statistics, as well as an auxiliary function that will sort the numbers, when called by the median function**. You may not use any Python statistical functions (including the sum function and the sort function) to do those four statistical operations.** Choose either the selection sort or the insertion sort (Code is given in the lecture. Do not use the bubble/push down sort in this assignment.

The mean, or average, is the sum of the scores divided by the number of scores.

The median of the scores. The median of the scores is the "middle" value, a value which as many of the scores are greater than as are less than. For example, the median of the three scores 4, 9, 8 is 8. The median of the four scores 8, 4, 7, 10 is 7.5.

The standard Deviation for a **sample** is given by the formula]:

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

where $\bar{x}$ is the mean and n is the number of items. Use a standard deviation formula that **does not require knowing the mean** to calculate the standard deviation.

The mode of the scores is the most frequently occurring score. Note: There may be multiple modes. Make sure your program can handle that situation. Requirements: Use a frequency table (list) to create occurrences of widget scores to find the mode(s). Use list comprehension to initialize the frequency table. Note: There may be multiple modes. Make sure your program can handle that situation.

You must use the following function names: mean, median, mode, std_dev, and sortem.

Sample runs:

This program produces the following descriptive statistics for a sample of widget scores:
The mean, median, mode, and, standard deviation
Input 21 widget scores
Input widget scores separated by commas 2,5,6,7,8,7,6,5,6,7,8,9,8,7,8,7,8,7,8,7,8
The mean for 21 values is 6.86
The median for 21 values is 7
The mode(s) for 21 values is 7 8
The standard deviation for 21 values is 1.53

This program produces the following descriptive statistics for a sample of widget scores:
The mean, median, mode, and, standard deviation
Input 23 widget scores
Input widget scores separated by commas 2,4,5,7,6,7,6,7,8,9,8,7,8,9,7,8,7,6,7,8,7,8,9
The mean for 23 values is 6.96
The median for 23 values is 7
The mode(s) for 23 values is 7
The standard deviation for 23 values is 1.64