

HW05 - Due Sunday 28 February 2016 before  
11:59 PM

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February 21, 2016

Write a C program , *class\_stats.c*, which is a continuation of the previous homework assignment, that does the following for a given number of assignments (exams, homework, quizzes, etc...):

1. the average of the grades ( $\mu$ )
2. the variance of the grades ( $\sigma^2$ )
3. the median
4. the highest grade
5. the lowest grade
6. a table showing the distribution of grades (use my grading scale for this)

Your program should have at least the functions listed below:

1. float calculate\_mean(const int grades[], int n);
2. float calculate\_variance(const int grades[], int n);
3. float calculate\_median(const int grades[], int n);
4. void sort\_array(int grades[], int n);
5. int calculate\_min(const int grades[], int n);
6. int calculate\_max(const int grades[], int n);
7. void get\_user\_input (int grades[], int n);
8. void display\_grades\_distribution(int m, const grades\_scale[11][m], struct Stats stats[]);

To accomplish this, create a structure, call it *Statistics* that has the mean, median, variance, minimum grade, maximum grade, and number of grades. Also,

1. create an array of structures that holds the stats for each assignment. This gets passed later to the display\_grades\_distribution function.
2. ask the user to input the number of graded assignments and the number of students in the class (do not hard-code them).
3. loop though the assignments and for each assignment
  - (a) input the grades for the class
  - (b) compute the statistics (mean, median, etc ...)
  - (c) update the array (grades\_scale) that stores the binned grades
  - (d) store the stats for that assignment in the structure (remember the stats for each assignment is in a structure and you should have an array of structures to hold the stats for each assignment).

4. display the output as shown in the sample output file.

Here are the formulas for the mean and variance for a sequence of numbers (array)  $x_i$

$$\mu = \frac{\sum_{i=1}^n x_i}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n x_i^2}{n} - \mu^2$$

Assignment 1 Assignment 2 Assignment 3				
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Class Statistics				
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Mean		1	1	1
Median		2	2	2
Variance		3	3	3
Min		4	4	4
Max		5	5	5
# of Students		6	6	6
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Grade Distribution				
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100 – 93	A	5	5	5
90 – 92	A-	4	4	4
etc	etc	9	9	9
etc	etc	10	10	10
etc	etc	5	5	5

Figure 1: Sample Output