

An Excel Project

Computing Grades for a Class

The objective of this project is for you to hone your proficiency in utilizing a spreadsheet for numerical calculations. You are to create your own spreadsheet to solve the grade calculation problem described in the following paragraphs.

Part 1: Solution to the Basic Problem

We wish to create a spreadsheet which will automate the computation of grades for a class. The work to be graded in the class in question consists of two tests, two lab projects, and a final exam. **Each** test will count 25% of the grade; **each** lab project will count 10%; the final exam will count 30%. However, the instructor varies these percentages occasionally, so we'd like to construct our spreadsheet so that these values are **problem parameters** (as opposed to being hard-coded into formulas) which can be easily modified without changing any formulas directly. Begin your project by constructing a spreadsheet that will compute the weighted average for each student in the class. Of course, the spreadsheet should be constructed so that all results are automatically recalculated whenever a grade is changed. The final display should look something like the following (use the data given here when you test your spreadsheet):

Tests = 25%
Projects = 10%
Exam = 30%

<i>Name</i>	<i>Test 1</i>	<i>Test 2</i>	<i>Project 1</i>	<i>Project 2</i>	<i>Exam</i>	<i>Average</i>
Bill Jones	80	70	90	85	83	79.90
Nan Knox	75	65	80	90	88	78.40
Jill Smith	83	99	87	89	90	90.10
JoeTimms	77	88	92	76	82	82.65

Try changing several of the grades in one of the rows. Check the revised spreadsheet calculation by computing the desired average using your calculator (or by hand) and comparing. If there is a discrepancy, find the error and correct the spreadsheet if necessary. Change the grades back to their original values before proceeding.

Next, try changing the percentage weights so that tests are now weighted 20% each, lab projects 10% and the final exam 40%. Check several of the new calculations your spreadsheet makes by computing the results with your calculator (or by hand) and comparing. If there is a discrepancy, find the error. If the spreadsheet results are incorrect, identify the problem and correct it. Before proceeding, change the percentage weights back to their original values.

Part 2: Adding Some Statistical Summaries

Suppose the instructor finds it convenient to have the average and standard deviation computed for all the grades (tests, projects, exam, and final averages). Use the built-in Excel functions **AVERAGE** and **STDEV** to compute these values and add them to the spreadsheet as shown below:

Tests = 25%
Projects = 10%
Exam = 30%

<i>Name</i>	<i>Test 1</i>	<i>Test 2</i>	<i>Project 1</i>	<i>Project 2</i>	<i>Exam</i>	<i>Average</i>
Bill Jones	80	70	90	85	83	79.90
Nan Knox	75	65	80	90	88	78.40
Jill Smith	83	99	87	89	90	90.10
Joe Timms	77	88	92	76	82	82.65
Average	78.75	80.50	87.25	85.00	85.75	82.76
St. Dev.	3.50	15.80	5.25	6.38	3.86	5.20

Part 3: Computing Letter Grades

The instructor uses a standard 10-point grading scale, but again may choose to change this scale later. Enhance your spreadsheet to include the calculation of the letter grades using the Excel **IF** function. Include the grading scale limits as **problem parameters** (similar to the way we did for the weighting percentages earlier), so these limits can be easily changed. Of course, any changes in numerical grades within the spreadsheet should result in automatic recalculation of the grades assigned. And a change in the grade scale limits should be automatically accounted for in the computation of the letter grades. Your modified spreadsheet should look something like the following:

Tests = 25% A scale is 90 through 100
Projects = 10% B scale is 80 up to 90
Exam = 30% C scale is 70 up to 80
 D scale is 60 up to 70
 F scale is 0 up to 60

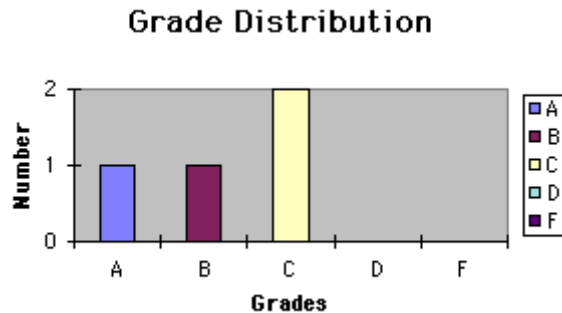
<i>Name</i>	<i>Test 1</i>	<i>Test 2</i>	<i>Project 1</i>	<i>Project 2</i>	<i>Exam</i>	<i>Average</i>	Grade
Bill Jones	80	70	90	85	83	79.90	C
Nan Knox	75	65	80	90	88	78.40	C
Jill Smith	83	99	87	89	90	90.10	A
Joe Timms	77	88	92	76	82	82.65	B
Average	78.75	80.50	87.25	85.00	85.75	82.76	
St. Dev.	3.50	15.80	5.25	6.38	3.86	5.20	

Try changing several of the grade scale limits, so that at least one of the letter grades will change. Check the revised spreadsheet calculation of the letter grades. If there is a discrepancy, find and correct the error. Change the grade scale limits back to their original values before proceeding.

Part 4: Adding a Grade Distribution and Histogram

Add an automatic computation of the grade distribution (by letter grade) to your spreadsheet using the Excel **COUNTIF** function. Once this distribution is calculated, construct a histogram (bar chart) to display the distribution graphically. Display this chart on the sheet (not as a separate sheet). For the above spreadsheet this would mean adding the following components:

Grade	Number
A	1
B	1
C	2
D	0
F	0



Change some of the numerical test and/or lab project grades in the original data (make the changes drastic enough to be certain some letter grades will change). Observe the corresponding changes in your chart. If these are not consistent with the changes in the letter grades assigned, find the error and correct it. Change the data back to their original values to conclude the project.