In-Class Activity Worksheet Solutions – Weighted Averages

Suppose the syllabus for a class indicates that the overall grade will be computed as follows.

Homework Average	15%
Midterm	20%
Project 1	20%
Project 2	20%
Final Exam	25%

PART 1

1a) Suppose the scores on the homework assignments throughout the semester are:

75%, 82%, 90%, 43%, 97%, 86%, 78%, 84%, 32%, 75%, 71%, 91%, 73%, 62%, 70%

What is the mean (average) of these scores? _____

73.93%

Note: We will take everything out to 2 decimal places during this exercise. Instructors can decide how accurate they want the intermediate data to be in order to address the concerns of rounding and its effect on the final overall grade (weighted average).

1b) Suppose the score on the midterm exam is 84%. Now, according to the syllabus, the midterm exam will account for 20% of the overall grade and hence we create a weight of 0.20 for this exam. To find the weighted score for the midterm exam, we multiply the score on the midterm by this weight. What is the weighted score for the midterm exam?

Note: This weighted score will be the number of points that will be contributed to the weighted average (overall grade).

84(.20) = 16.80 points

1c) In addition to the previous information, suppose the remaining scores are as follows.

Project 1: 73%

Project 2: 90%

Final Exam: 72%

Complete the table below with the given information from #1a - #1c and compute the weighted score for each category.

Categories	Scores (percent)	Weights (decimal)	Weighted Scores
Homework Average	73.93	0.15	11.09
Midterm	84.00	0.20	16.80
Project 1	73.00	0.20	14.60
Project 2	90.00	0.20	18.00
Final Exam	72.00	0.25	18.00
Total		1.00	78.49

1d) What is the Sum (Total) of the Weights column? Is there a reason the total is this?

1.00

The sum of the weights needs to add up to 1 as that corresponds to 100% of the overall grade.

1e) What is the Sum (Total) of the Weighted Scores column? This point total is also the overall grade (as a percent) that the student has earned.

78.49 points = 78.49% since the points comprise 100% of the overall grade.

PART 2

2a) Suppose the student has completed everything except the final exam and they want to know their cumulative weighted grade prior to taking the final exam.

Complete the chart below with the information provided in Part 1. This is the same information from #1c, with the exception that the Final Exam is no longer included.

Categories	Scores (percent)	Weights (decimal)	Weighted Scores
Homework Average	73.93	0.15	11.09
Midterm	84.00	0.20	16.80
Project 1	73.00	0.20	14.60
Project 2	90.00	0.20	18.00

2b) What is the Sum (Total) of the Weights column?

0.75

2c) What is the Sum (Total) of the Weighted Scores column? Is this the student's cumulative weighted grade (as a percent) prior to taking the final exam? Why or why not?

Hint: Refer to the scores in the chart to see if this number "makes sense" for the current cumulative grade.

60.49 points

No, this is not the student's cumulative grade up to this point (as a percent). This score is only 75% of the overall grade which needs to be incorporated into the computation.

2d) Compute the student's cumulative weighted grade prior to taking the final exam. Does your answer make sense?

For assistance, consider the questions (i)-(iii) on the next page.

80.65% ; Yes, the answer makes sense because all of the original scores are between 70% and 90%.

i.   How many points have been earned towards the overall weighted grade up to this point? (Note: This is the sum of the weighted scores from 2c.)
60.49 points

ii.   What is the maximum number of points that could be earned towards the overall weighted grade up to this point?

Hint: Consider the Sum (Total) of the Weighted Scores column if a student achieved an Original Score of 100% in each category (homework average, midterm, project 1, and project 2). What is the connection between this answer and the answer from 2b? Why is this the case?
75 points

The student has completed 75% of the overall weighted grade and the total number of points that can be earned towards the weighted grade is 75 points.

iii.   Compute the student's cumulative weighted grade using the answers from (i) and (ii).
60.49/75 = 0.8065 = 80.65%

Part 3

Weighted averages are not only used to compute grades, but are also used in the financial world. One such example is a financial portfolio.

A *portfolio* is a collection of investments, such as stocks, bonds, and cash. The expectation is that these investments will earn a return or grow over time.

The *annual rate of return* is the percent change in the value of an investment over one year.

$$\text{Annual Rate of Return} = \frac{\text{Ending Quantity} - \text{Starting Quantity}}{\text{Starting Quantity}} \cdot 100$$

3a) Suppose an investor's portfolio contains stocks. At the beginning of the year, they invested $5000 and at the end of the year, they had a total of $5500. What is the investor's annual rate of return for their stocks?

$$\color{red}\frac{5500 - 5000}{5000} \cdot 100 = 10\%$$

Now that the investor understands an annual rate of return, suppose they have a set amount of funds they would like to invest. They decided to invest 65% of the funds in stocks, 25% of the funds in bonds, and 10% of the funds in cash.

After a year, the investor is notified that the rate of return for the stocks was 10%, the rate of return for the bonds was 7%, and the rate of return for the cash was 5%.

They would like to compute the weighted average return for the year.

3b) Complete the following chart with the appropriate Categories, Values, and Weights.

Categories	Rate of Return (percent)	Weight (decimal)	Weighted Rate of Return
Stocks	10	.65	6.50
Bonds	7	.25	1.75
Cash	5	.10	0.5

3c) Predict the weighted average return for the year and explain your reasoning. Then, compute the weighted average return for the year. Was your estimate close?

The student should predict a number between 5 and 10, closer to 10 as the weight for stocks is significantly higher than the other weights.

8.75%