

## How to estimate my grade in MATH 1100?

Suppose Claire had 5 unexcused absences, her average score on quizzes and webwork was 7.8 (out of 10) and her test scores were 6, 6 and 9 (out of 10). Each unexcused absence has cost 0.8% of Claire's course grade, thus, instead of earning 10%, she earned  $10 - 5 \cdot 0.8 = 6$  percent for attendance. The lowest number in the sequence 7.8, 6, 6, 9 is 6, so we drop it (but only once). The average of the remaining numbers is

$$\frac{7.8 + 6 + 9}{3} = 7.6.$$

We can say that Claire's *in-class performance* was 76 percent. According to the syllabus, we take either each test with 20% weight and the final with 30% weight, or we take each test with 13% weight and the final with 51% weight. If Claire scores  $x$  percent on the final then her overall score will be the larger of

$$6\% + 0.6 \cdot 76\% + 0.3 \cdot x\% \quad \text{and} \quad 6\% + 0.39 \cdot 76\% + 0.51 \cdot x\%.$$

If we solve the inequality  $6\% + 0.6 \cdot 76\% + 0.3 \cdot x\% \leq 6\% + 0.39 \cdot 76\% + 0.51 \cdot x\%$ , we get  $x \geq 76\%$ , where 76% was Claire's in class performance. This is not surprising: giving more weight to the final helps only if you do better on it than your in-class performance.

**Best case scenario:** Claire scores 100% on the final. In this case, her overall score will be

$$6\% + 0.39 \cdot 76\% + 0.51 \cdot 100\% = 86.64\%.$$

This is better than 75% and worse than 90% so Claire gets a "B".

**Worst case scenario:** Claire scores 0% on the final. In this case, her overall score will be

$$6\% + 0.6 \cdot 76\% + 0.3 \cdot 0\% = 51.6\%.$$

This is still more than 50% but less than 60% so she gets a "D".

**Average scenario:** Claire scores 76% on the final, exactly the same as her in class performance. Either rule gives the same overall score:

$$6\% + 0.6 \cdot 76\% + 0.3 \cdot 76\% = 6\% + 0.39 \cdot 76\% + 0.51 \cdot 76\% = 6\% + 0.9 \cdot 76\% = 74.4\%.$$

This is just a little shy of 75%, Claire is likely to get a "C", unless her instructor decides to round up all scores between 74% and 75% to 75%. (Not likely.)

**At least how much should Claire get on the final to get a "B" ?**

Claire needs to do better than her average in-class performance, so we will use the second formula. The solution of

$$6\% + 0.39 \cdot 76\% + 0.51 \cdot x\% \geq 75\%$$

is  $x \geq 77.17\%$ .

**At least how much should Claire get on the final to get a "C" ?**

Claire does not need to do better than her average in-class performance, so we can use the first formula. The solution of

$$6\% + 0.6 \cdot 76\% + 0.3 \cdot x\% \geq 60\%$$

is  $x \geq 28\%$ . Scoring 28% would be an "F" on the common final but still enough for the "C" in the course.