Performance on Final vs. Desired Grade

Assume all the midterm grades are in and most of the homework scores and iClicker scores are available (with just a few more to be posted). Further assume that you are curious about the level of performance that is necessary on the final exam to obtain a particular overall score leading to a desired letter grade.

Here is what your grade is based on:

- T_1: score on Test 1; 19% of grade (weight 0.19).
- T_2: score on Test 2; 19% of grade (weight 0.19).
- T_3: score on Test 3; 19% of grade (weight 0.19).
- H_h: score on handwritten homework; 7% of grade (weight 0.07). Two lowest scores dropped. All assignments carry equal weight regardless of number of questions.
- H_m: score on handwritten homework; 7% of grade (weight 0.07). Two lowest scores dropped. All assignments carry equal weight regardless of number of questions.
- I_c: score on iClicker polling; 8% of grade (weight 0.08). Three lowest scores dropped and 15% added to score after accounting for drops.
- F_n: score on final exam; 21% of grade (weight 0.21).
- Total: score after combining all the values above with the appropriate weights.

Putting all this together, here is the formula for your Total score

$$\text{Total} = 0.19(T_1 + T_2 + T_3) + 0.07(H_h + H_m) + 0.08I_c + 0.21F_n.$$

As we approach the final, you can't exactly pin down the homework and iClicker score, but you should be able to come up with a reasonably accurate approximation for what these scores will be when all is said and done. The midterm grades you know exactly.

So, how well do you have to do to obtain a desired Total score? Simply plug in the desired Total score and solve for F_n:

$$F_n = \frac{\text{Total} - (0.19(T_1 + T_2 + T_3) + 0.07(H_h + H_m) + 0.08I_c)}{0.21}.$$

As an example, assume a student is hoping to get a B in the class. That requires a minimum score of 78. Let's assume this student's scores on the three midterms exams were 65, 75, and 72. An estimate of the handwritten and mastering homework scores are 85 and 80. For iClicker, after accounting for the drops and adding the 15%, let's assume the score is about 94. Putting these scores together with the appropriate weights yields 59.35. Subtracting this from the desired Total score of 78 and dividing by 0.21 yields 88.81 which we'll round up to 89 as the minimum necessary score on the final to obtain a B. Is this possible? Certainly it's mathematically possible and note that we're aiming for a final grade that is higher than what was achieved on any of the individual exams.

Now, instead, let's assume this same student merely wishes to pass the class with a C or better. In this case the Total score merely needs to be no lower than 61. Thus, in this case we subtract 59.35 from 61 and divide by 0.21. In this case, given these past scores, the student would merely need to get 8 or more points on the final exam to pass the course. (Thus the student could have a disastrously awful final exam and still pass the course.)

For reference, here is the mapping of Total score to letter grades:

≥ 92:	A
≥ 88 and < 92:	A-
≥ 84 and < 88:	B+
≥ 78 and < 84:	B
≥ 74 and < 78:	B-
≥ 70 and < 74:	C+
≥ 61 and < 70:	C
≥ 57 and < 61:	C-
≥ 50 and < 57:	D
< 50:	F