How To Grade

Principles

In 2006, we complete overhauled our way of assigning grades in 6.034, basing our new approach on the following principles:

- Each quiz should be short enough to reduce or eliminate time pressure and each quiz should focus on material recently covered in homework.

Hence, we moved from two packed quizzes to four, more relaxed quizzes.

- We care about what the students know, not when they know it.
- We should minimize the effect of having a bad day because of fatigue or other circumstance.
- We should minimize the effect of a flawed quiz or final.

Hence, the final consisted of five sections, four of which covered material corresponding to that covered in the four quizzes (the remainder covered material between the fourth quiz and the final). Students were informed that they would get the higher of the grade on each quiz and the corresponding section of the final. They were also informed that if they were satisfied with their grade on a particular quiz, they need not do the corresponding section on the final at all. Accordingly, students concentrated their study in preparation for the final on exactly that material that called for improvement. Many worked only on two or three parts of the final.

- We should not grade on a curve. Instead, we should establish performance thresholds.

One reason is that curve-based grading is against MIT policy. Another is that students are counter-productively obsessed with class averages.

Accordingly, we decided, *ante* quiz on three thresholds: one separated *thorough understanding* (roughly, A level work) from *adequate understanding* (roughly, B level work); another separated *adequate understanding* from *needs work* (roughly, C level work); the third, fixed at fifteen points below the second, separated *needs work* from *poor performance* (roughly, D level work).

Occasionally, we adjusted the thresholds *post* quiz if we decided we had asked for performance beyond what was reasonable.

We were proud to tell students, when asked what class average was, that we had no idea.

One side effect of the principles working together is that many more students were able to demonstrate A level performance in the subject. Only a handful were unable to get themselves into the A or B level.

Student reaction

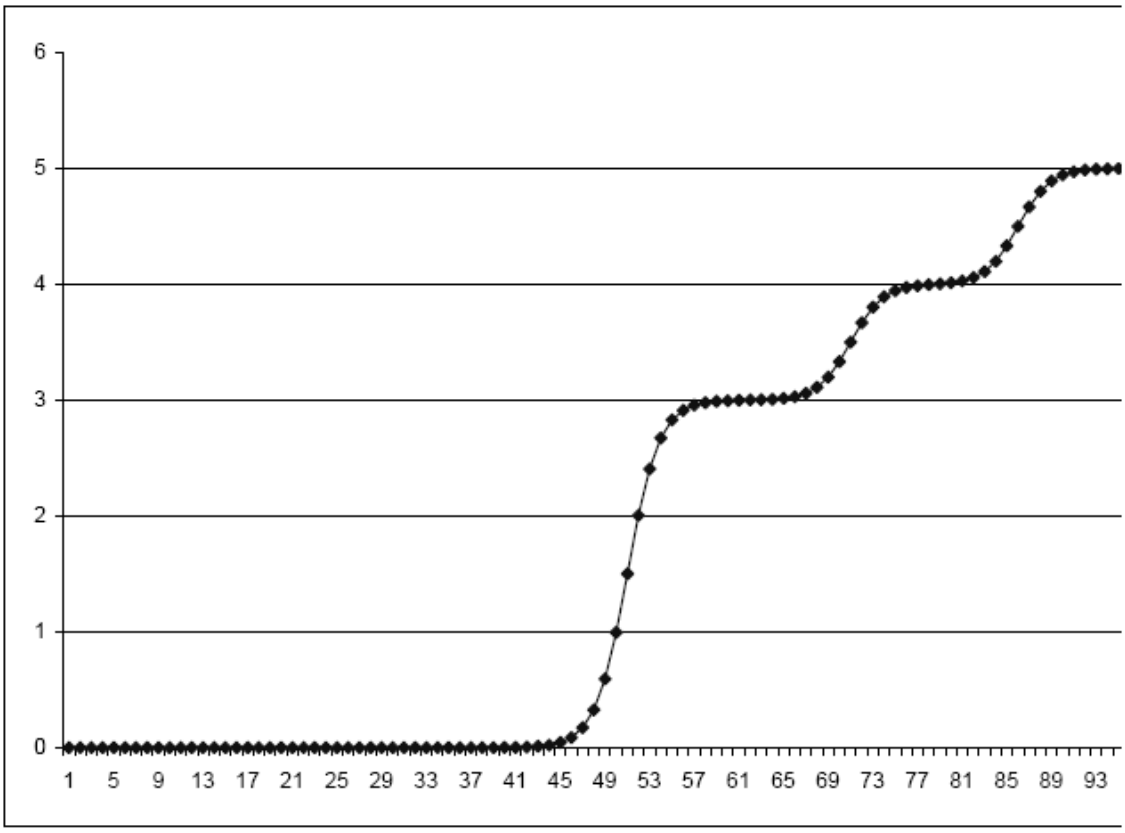
As demonstrated through subject evaluation, they loved our new approach, and bragged to their friends about the way 6.034 grading worked, as if they had invented it themselves.

Combination

Because scores on the quizzes, and the thresholds, varied from quiz to quiz, and because we had decided to use a maximizing function, putting together an overall score was an interesting problem. We decided to run each quiz score and each section-of-the-final score through the following formula, where s is the numerical score and the Greek letters are the thresholds:

$$\text{adjusted score} = \frac{3}{1 + e^{-}0.7 \times (s - \alpha)} + \frac{1}{1 + e^{-0.7 \times (s - \beta)}} + \frac{1}{1 + e^{-}0.7 \times (s - \gamma)}$$

That is, we ran each scoring element through a staircase function such as that on the next page, shown for thresholds of 50, 70, and 85.



Then, we took the maximum of each adjusted quiz score and adjusted score on the corresponding final section, and from the maxima formed an average, a kind of 6.034 GPA (Grade Point Average). 4.5 or better produced an A; 3.5 or better a B; 2.5 or better a C; below 2.5 a D or F. We gave no Fs.