1998 MCM

Problem B
Grade Inflation

Background

Some college administrators are concerned about the grading at A Better Class (ABC) college. On average, the faculty at ABC have been giving out high grades (the average grade now given out is an A-), and it is impossible to distinguish between the good and mediocre students. The terms of a very generous scholarship only allow the top 10% of the students to be funded, so a class ranking is required.

The dean had the thought of comparing each student to the other students in each class, and using this information to build up a ranking. For example, if a student obtains an A in a class in which all students obtain an A, then this student is only "average" in this class. On the other hand, if a student obtains the only A in a class, then that student is clearly "above average". Combining information from several classes might allow students to be placed in deciles (top 10%, next 10%, etc.) across the college.

Problem

Assuming that the grades given out are (A+, A, A-, B+, . . .) can the dean's idea be made to work?

Assuming that the grades given out are only (A, B, C, . . .) can the dean's idea be made to work?

Can any other schemes produce a desired ranking?

A concern is that the grade in a single class could change many student's deciles. Is this possible?

Data Sets

Teams should design data sets to test and demonstrate their algorithms. Teams should characterize data sets that limit the effectiveness of their algorithms.