

ALGORITHMIC HOMEWORK IN FINITE MATH– WHAT ARE THE BENEFITS?

Dr. Janice Epstein
Department of Mathematics
Texas A&M University
College Station, TX 77843
j-epstein@tamu.edu www.math.tamu.edu/~epstein

In the Fall semester of 2003 my Finite Math classes were assigned algorithmic quizzes and homework on the internet. In previous semesters the students did paper homework from the textbook and static quizzes on the internet. Paper homework is traditional, but has many drawbacks:

- It must be graded by hand. This is time consuming and labor intensive. Turnaround time is a week or more.
- All students have the same questions – too much help is available (copying!).
- Can't practice until mastery – only a few of each problem type.
- Success on homework does not correlate well with success in the class as measured by performance on the final exam. For Fall 2002 and Spring 2003 semesters, the correlation was only $R=0.367$ (Figure 1).

However, algorithmic computer homework is new and I have found that it has both good and bad points. Some drawbacks to having homework and quizzes on the computer include dependence on internet connection and student computer configurations. It can be difficult to grade multi-step problems electronically and students need to be careful which assignments they choose to take.

The advantages to algorithmic computer assignments are numerous and include:

- Assignment is graded instantly on the computer.
- Grades can be dropped into a spreadsheet at any time.
- The questions regenerate each time with new values.
- Multiple tries with feedback can be allowed to enable practice.
- There is a higher correlation between a student's homework grade and the grade on the final exam, $R=0.500$. See Figure 2.

Many of the differences are beneficial to both the student and the teacher. For one, the difference in the correlation between homework grades and the final exam ($\Delta R = +0.133$) is statistically significant. The computer based algorithmic homework is doing a better job preparing the students for the final exam and overall success in their math class. Figures 1 and 2 show the 90% ellipses. Note that the algorithmic homework shows less bias towards high homework grades and low exam performance – a very desirable effect. The decrease in grading time was also significant. With a clear benefit to both the student and the teacher, I plan to continue to use algorithmic assignments in future semesters.

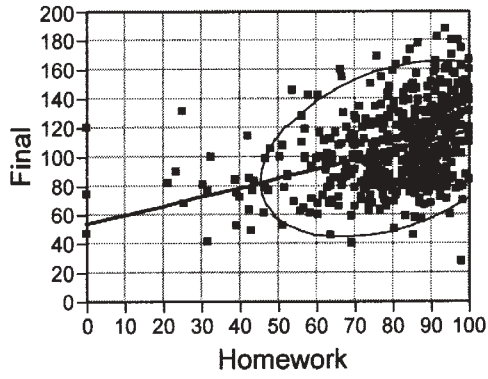


Figure 1 – Fall 2002 to Spring 2003 (Non Algorithmic Homework) vs. Final Exam Score. $R = 0.367$. Total of 486 students.

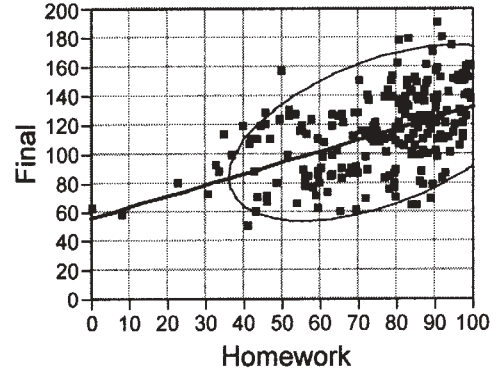


Figure 2 – Fall 2003 to Spring 2004 (algorithmic) homework vs. Final Exam Score. $R = 0.500$. Total of 217 students.