

Is There Really A Difference Final Exam

- 1) Mr. Towne could not get a date on Saturday nights for about 10 years. He was so lonely that he flipped coins over and over again. He found that if you flip a coin 100 times, the number of heads that occurred is normally distributed. The mean number of heads would be 50 (duh) with a standard deviation of 5. He noticed that 95% of the time, the number of heads would be between what two numbers?
- 2) In a recent article “Where Have All the Science Majors Gone? To Easier Grades” in an issue of *The Journal of Economic Perspectives*, Richard H. Sabot and John Wakemann-Linn of Williams College determine that departments such as mathematics, chemistry, and economics maintain tough grading standards while departments such as art, English, music, philosophy, and political science have become high graders. The authors found that the grades had a significant effect on students’ subsequent course choices, enhancing the probability that they will take a second course in an easy grading department. They also found that their grades in tough graded courses were more accurate predictors of students’ future performance. Sabot and Wakemann-Linn urge a return to stricter grading standards by all departments because, they say, would “not only provide more accurate information to students about their relative strengths and weaknesses, but might well encourage them to study more science and mathematics.”

Mr. Towne has found that out of 1013 mathematics students, 278 (about 27.4%) failed in the first quarter this year. He also found that out of 1301 students in English classes, 336 (about 25.8%) failed. Test Dr. Sabot’s and Dr. Wakemann-Linn’s hypothesis that more students fail mathematics classes than English classes.

- a) Write the null hypothesis
 - b) Find the χ^2 - statistic.
 - c) Give your conclusion with a **detailed** explanation of why you made that decision.
 - d) According to the data, 278 out of 1013 (about 27.4%) of mathematics grades were “F”s and 336 out of 1301 (25.8%) English grades were “F”s. Why can’t we say that the number of students failing mathematics classes was significantly higher than those failing English classes by looking at the percents rather than the χ^2 – statistic? Explain.
- 3) Extra credit: Bertha and Bob’s big boy Billy Bob flipped a fair coin 50 times. If “H” represents heads and “T” represents tails, this is a list of his flips:

H H T T T T H H T H H H H H H H H T H H H T H H H T T T H T H T T T
H H T H T H H H H H T H T H H

What is the probability of getting a “head” on the next flip? _____