

Math 300 Spring 2004

Due dates:

1. first draft Monday April 12
2. final draft Monday April 26- NO EXCEPTIONS

I. If a prime number p divides the product of two numbers m and n then it divides one of them. Use this fact to explain a peculiar property of rectangles. Let A be a rectangle composed of p unit squares, where p is prime. Let B be any other rectangle. Show that if it is possible to take a number of copies of A , cut them all up into squares and lay the squares to cover B , then you can cover B with copies of A with no cutting.

II. The ISBN code of a book provides 9 digits of information and a check digit. If someone has made one of the following errors in copying the number

1. miscopied exactly one digit.
2. switched two adjacent digits

then the check digit computed according to the following rule will not be the same as the 10th digit. To compute the check digit multiply the first digit by 1, the second by two, the third by three, and so on. Finish by multiplying the ninth digit by 9. Add up these numbers. The check digit is the remainder when this number is divided by 11. (If the remainder is 10, the check digit is written X.)

III. The note, Mathematics of Essay 3, posted on the web, explains the mathematics necessary to show the ISBN check digit works as described.

IV. Assignment. Write a 3-5 page essay discussing two issues.

1. Explain why Statement 1 works.
2. Explain to a person who knows the language of modular arithmetic why the code works as described. That is, explain why the two kinds of errors described above are detected. In your essay discuss the reasons that such a code are desirable. How do you imagine this coding is actually used? Does anyone except a math undergrad ever compute an ISBN number by hand? What important fact about 11 makes this scheme work?
3. Your discussion of the first issues should show the connection between them.