MATH 113: DISCRETE STRUCTURES
HOMEWORK DUE WEDNESDAY WEEK 12

Problem 1. Read §6.5 of the Lovász, et al., text again. Comment on the relative merits of the book's proof and the one we discovered in class.

Problem 2. Let p be prime and a be an integer $1 \leq a \leq p - 1$. Consider the product

$$a(2a)(3a) \cdots ((p-1)a).$$

Let r_i be the remainder of ia upon division by p. It then follows that $a(2a)(3a) \cdots ((p-1)a)$ and $r_1 r_2 \cdots r_{p-1}$ have the same remainder upon division by p. We saw in Problem 2 of HW12M that $r_1, \ldots, r_{p-1}$ are exactly the numbers $1, 2, \ldots, p-1$ in some order. Use these facts to prove that $a^{p-1} - 1$ is divisible by p.