PROBLEM 1. A group of 17 people stack their books in 11 piles of equal size, each containing more than one book, and an additional pile containing 6 books. They collect the books and this time stack them into 17 equally-sized piles, with none left over. What is the smallest number of books they could have had? [Hint: -3 is the multiplicative inverse of 11 modulo 17.]

PROBLEM 2. Find *all* solutions $x \in \mathbb{Z}$ to the system of congruences

$$\begin{aligned} x &\equiv 2 \pmod 4 \\ x &\equiv 3 \pmod 5 \\ x &\equiv 4 \pmod 9. \end{aligned}$$

PROBLEM 3. Find all integers x, y such that

$$\begin{aligned} 2x + 5y &\equiv 4 \pmod{11} \\ x + 3y &\equiv 7 \pmod{11}. \end{aligned}$$

PROBLEM 4. Does Sunzi's theorem still hold if we drop the requirement that the n_i are relatively prime? Prove your assertion or provide a counterexample.

PROBLEM 5. Show there are no integer solutions to the equation

$$x^4 - 125x^3 - 75x^2 + 5x + 15 = 123456789.$$