

Math 565 - Spring 2019

Homework 5

Due March 20, 2019

There are certain things whose number is unknown. If we count them by threes, we have two left over; by fives, we have three left over; and by sevens, two are left over. How many things are there?

— Sunzi Suanjing, 3rd century AD

Turn in: 5-1.3, 5-3.1(a,c) 5-3.4 (From the textbook) and the following:

- (1) Find the unique solution to $12x \equiv 21 \pmod{31}$.
- (2) Let $m, n > 1$ be (not necessarily coprime) integers. Prove that the two congruences $x \equiv a \pmod{m}$ and $x \equiv b \pmod{n}$ admit a simultaneous solution if and only if $\gcd(m, n)$ divides $a - b$.