

Number Theory Quiz II

RDB

July 23, 2021

Problem 1 Is 150 congruent to 125 mod 7?

Solution 1

No. Their difference, 25, is not divisible by 7.

Problem 2 How many mutually incongruent solutions are there to $11x \equiv 1 \pmod{100}$?
(You don't have to say what the solutions are, just how many there are.)

Solution 2

The gcd of 11 and 100 is 1, and 1 divides 1, so there is exactly one mutually incongruent solution.

Problem 3 By plugging values in, find the x in $\{0, 1, 2, 3\}$ such that $2x \equiv 0 \pmod{4}$.
Give two more solutions not in this set.

Solution 3

Clearly $x = 0$ and $x = 2$ will work. These numbers plus any multiples of 4 will also be solutions. So, for example, $0 + 4 = 4$ and $2 - 4 = -2$ are also solutions.