Assignment-02

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Name of the Assignment: Practicing how to find Modulo and Multiplicative Inverse?

1. -17 Mod 23 ?

We know,

$$-17 = 23 \times -1 + 6$$

This tells us when we divide -17 by 23, the quotient is -1, and the remainder is 6.

So,

$$-17 \mod 23 = 6$$

General rule:

When dealing with negative numbers in modulo use formula:

$$a \mod m = ((a \% m) + m) \% m$$

So here,

$$-17 \mod 23 = ((-17 \% 23) + 23) \% 23 = (17 + 23) \mod 23$$
$$= 6 \% 23 = 6$$

Multiplicative Inverse of -13 upon modulo 23?

find a number x such that:

$$(-13) \cdot x \equiv (1 \pmod{23})$$

Step 1: Convert to a positive number mod 23.

$$-13 \bmod 23 = 10$$

So, $10 \cdot x \equiv 1 \pmod{23}$

Step 2: Try values of x or use Extended Euclidean Algorithm

- $10 \cdot 1 = 10$
- $10 \cdot 2 = 20$
- $10 \cdot 3 = 30 \equiv 7$
- $10 \cdot 4 = 40 \equiv 17$
- ⋮
- $10 \cdot 7 = 70 \equiv 1 \pmod{23}$

So, $x = 7$

∴ Multiplicative inverse of $-13 \bmod 23$ is 7