$-17 \mod 23$

To compute $-17 \mod 23$, we want the least non-negative residue, a number r such that

$$-17 \equiv r \pmod{23}, \quad 0 \leq r < 23$$

we can do this by adding 23 until we get a positive result:

$$-17 + 23 = 6$$

So, $-17 \mod 23 = 6$

(Ans:)

Multiplicative Inverse: $-13 \bmod 23$

We are looking for x such that:

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

Since, $-13 \equiv 10 \pmod{23}$

this is equivalent to find:

$$10x \equiv 1 \pmod{23}$$

Using extended euclidean algorithm:

$$23 = 2 \times 10 + 3$$

$$10 = 3 \times 3 + 1$$

$$3 = 3 \times 1 + 0$$

Back substitute:

$$1 = 10 - 3 \times 3$$

$$= 10 - 3 \times (23 - 2 \times 10)$$

$$= 7 \times 10 - 3 \times 23$$

$\therefore$ Modular inverse of 10 mod 23 $(-13 \bmod 23)$ is 7 Ans: