Representations of Integers

Assignment-3

* $-17 \bmod 23$:-

$$23) -17 \,|\, -1$$
$$\underline{+23}$$
$$6$$

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

$$-17 \bmod 23 = 6$$ Ans:

~~we found~~

* Multiplicative Inverse of $-13 \bmod 23$;-

The multiplicative inverse of a number $a \bmod m$ is a number x such that : $ax \equiv 1 \bmod m$

In our case, we are looking for a number x such that :

$$-13x \equiv 1 \bmod 23$$

To simplify, we first convert -13 into a positive equivalent module 23.

$-13 \bmod 23 = -13 + 23 = 10$

So, the equation become is:-

$10x \equiv 1 \bmod 23$.

Now, we find the integer x such that:

$10x \equiv 1 \bmod 23$

Now:

if $x=1$, $10\times1 = 10 \not\equiv 1 \bmod 23$

if $x=2$, $10\times2 = 20 \not\equiv 1 \bmod 23$

if $x=3$, $10\times3 = 30 \not\equiv 1 \bmod 23$

if $x=4$, $10\times4 = 40 \equiv 17 \bmod 23$

if $x=5$, $10\times5 = 50 \equiv 4 \bmod 23$

if $x=6$, $10\times6 = 60 \equiv 14 \bmod 23$

if $x=7$, $10\times7 = 70 \equiv 1 \bmod 23$

we found it: $10\cdot7 = 70 \equiv 1 \bmod 23$

Since $-13 \equiv 10 \bmod 23$ and $10^{-1} \bmod 23 = 7$

we conclude

~~The multiplican inverse~~

The multiplicant inverse of $-13 \bmod 23$ is 7.