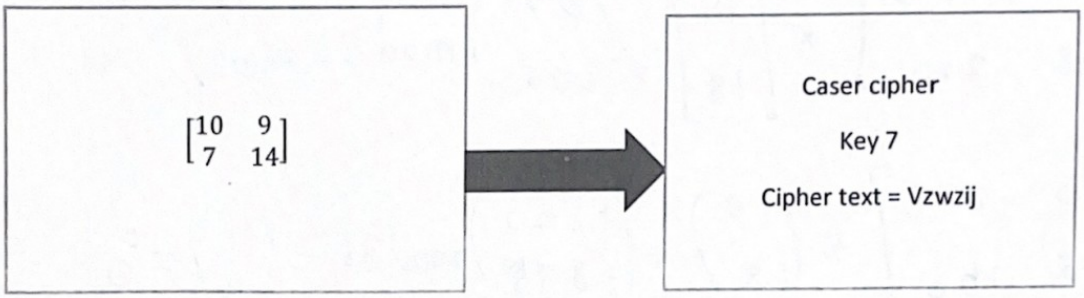
Find the **Plain text** (Using Euclidean and extended Euclidean method) (Hill cipher then Caser Cipher)



Plaintext →	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
Ciphertext →	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Value →	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Caeser cipher $\left(\begin{pmatrix} V=21 & W=22 & i=8 \\ Z=25 & Z=25 & j=9 \end{pmatrix} - 7\right) \bmod 26 =$

$(21-7) \bmod 26 = 14 = O$
$(25-7) \bmod 26 = 18 = S$
$(22-7) \bmod 26 = 15 = P$
$(25-7) \bmod 26 = 18 = S$
$(8-7) \bmod 26 = 1 = B$
$(9-7) \bmod 26 = 2 = C$

→ OSPSBC

Euclaedian =

$\det\left(\begin{bmatrix} 10 & 9 \\ 7 & 14 \end{bmatrix}\right) = 77 \bmod 26 = 25 \quad 25^{-1} \bmod 26 \Rightarrow$

$26 = 25 * 1 + 1$

$25 = 25 * 1 + 0$

$1 = 26 - 1 * 25$

$1 = -1 * 25 + 26 \quad -1 \bmod 26 = 25$

$25 \times 25 = 625 \bmod 26 = 1$ ✓

$$25 \times \begin{bmatrix} 14 & -9 \\ -7 & 10 \end{bmatrix} = \begin{bmatrix} 350 & -225 \\ -175 & 250 \end{bmatrix}$$

$$\begin{bmatrix} 350 & -225 \\ -175 & 250 \end{bmatrix} * \begin{bmatrix} 14 \\ 18 \end{bmatrix} = \begin{pmatrix} 850 \\ 2050 \end{pmatrix} \bmod 26 = \begin{pmatrix} 18 \\ 22 \end{pmatrix} = \begin{matrix} S \\ W \end{matrix}$$

$$\begin{bmatrix} 350 & -225 \\ -175 & 250 \end{bmatrix} \times \begin{pmatrix} 15 \\ 18 \end{pmatrix} = \begin{pmatrix} 1200 \\ 1875 \end{pmatrix} \bmod 26 = \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{matrix} E \\ D \end{matrix}$$

$$\begin{bmatrix} 350 & -225 \\ -175 & 250 \end{bmatrix} \times \begin{pmatrix} 1 \\ 2 \end{pmatrix} = \begin{pmatrix} -100 \\ 325 \end{pmatrix} \bmod 26 = \begin{pmatrix} 4 \\ 13 \end{pmatrix} = \begin{matrix} E \\ N \end{matrix}$$

SWEDEN