1. Find the inverse of

\[ A = \begin{pmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 3 & 4 & 6 \end{pmatrix} \mod 11. \]  

(1)

2. Find the inverse of

\[ A = \begin{pmatrix} 10 & 5 & 12 \\ 3 & 14 & 21 \\ 8 & 9 & 9 \end{pmatrix} \mod 26. \]  

(2)

3. Find the inverse of 234 mod 12349.

4. Implement RSA with \( p = 443 \) and \( q = 149 \).

1. What is \( \phi(n) \) where \( n = pq \)?

2. If the encryption exponent is chosen as 141 what is the decryption exponent?

3. Encrypt \( P = 236 \) with 141 as the encryption exponent.

4. What is \( \phi(\phi(n)) \)? What does this number signify?

5. Solve the following system of equations

\[ \begin{align*}
    x &= 5 \mod 13 \\
    x &= 6 \mod 11 \\
    x &= 9 \mod 17 \\
    x &= 4 \mod 19
\end{align*} \]

(Find \( x \mod 13 \times 11 \times 17 \times 19 \)).

6. Consider the field of integers mod 79.

1. How many generators does this field have? List all of them.

2. Find the order of all the numbers 1, 2, \ldots, 78.