Example 1. Solve the following linear system

\[(1 + i)x_1 + (2 + i)x_2 = 5,\]
\[(2 - 2i)x_1 + ix_2 = 1 + 2i.\]

Example 2. Find the determinant of the coefficient matrix in Example 1.
Example 3. Find the eigenvalues and eigenvector of

\[ A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix} \]
Example 4. Find the eigenvalues and eigenvector of

\[
A = \begin{bmatrix}
2 & 0 & 0 \\
0 & 2 & i \\
0 & -i & 2
\end{bmatrix}
\]

Remark: If \( A \) is a Hermitian matrix (i.e., \( \overline{A^T} = A \)), then