MAT 250 Homework 6
Spring 2026

Due date: Wednesday, March 4

In the following problems find rref(A) using Gauss-Jordan with partial pivoting, showing all steps and labeling each step with the row operation abbreviation as in the project assignment. Express each complex number in Cartesian form.

Row operations (and abreviations):

- i) swap rows i and j: $R1(i, j)$
- ii) multiply row i by a nonzero constant c: $R2(i, c)$
- iii) replace row i by itself plus a nonzero multiple c of row j: $R3(i, j, c)$

1. $A = \begin{pmatrix} 1-i & i \\ 2 & 1+i \end{pmatrix}$

2. $A = \begin{pmatrix} 1+i & -i \\ -1+i & 1 \end{pmatrix}$

3. $A = \begin{pmatrix} 1-i & i & 1+i \\ 2 & 1+i & i \end{pmatrix}$

4. $A = \begin{pmatrix} 1+i & -i & i \\ -1+i & 1 & 1-i \end{pmatrix}$

5. For the next problem let $A = F_3$ be the Fourier matrix for $N = 3$ which has values

$$a_{t,k} = e^{i\frac{2\pi}{3}kt}, \quad 0 \le t, k \le 2.$$

Let the columns of this matrix be labelled $\mathbf{u}_k$ for $k = 0, 1, 2$, and let $\mathbf{v}$ be the vector $(1, 2, 3)^T$. Find coefficients c_0, c_1, and c_2 so that

$$c_0\mathbf{u}_0 = c_1\mathbf{u}_1 + c_2\mathbf{u}_2 = \mathbf{v}$$

in two ways:

a) using Gauss-Jordan on the augmented matrix $A|\mathbf{v}$.

b) using dot products and orthogonality