

MAT 250

Quiz 4

Spring 2026

1. Choose the result of performing two row operations on A , one of type ii) and one of type iii) (no row swaps) so that the result finishes processing column one.

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

- a) $\begin{pmatrix} 1 & -1+i \\ 0 & 0 \end{pmatrix}$ b) $\begin{pmatrix} 1 & i \\ 0 & 2 \end{pmatrix}$ c) $\begin{pmatrix} 1 & 2i \\ 0 & 1-i \end{pmatrix}$ d) $\begin{pmatrix} 1 & i-1 \\ 0 & 2i \end{pmatrix}$ e) $\begin{pmatrix} 1 & -1+i \\ 0 & 2 \end{pmatrix}$

Correct Answer: $\begin{pmatrix} 1 & -1+i \\ 0 & 2 \end{pmatrix}$

2. Same question for the matrix B :

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

- a) $\begin{pmatrix} 1 & i \\ 0 & 2 \end{pmatrix}$ b) $\begin{pmatrix} 1 & 2i \\ 0 & 1-i \end{pmatrix}$ c) $\begin{pmatrix} 1 & i-1 \\ 0 & 2i \end{pmatrix}$ d) $\begin{pmatrix} 1 & -1+i \\ 0 & 0 \end{pmatrix}$ e) $\begin{pmatrix} 1 & -1+i \\ 0 & 2 \end{pmatrix}$

Correct Answer: $\begin{pmatrix} 1 & -1+i \\ 0 & 0 \end{pmatrix}$

3. Same matrices A and B as in the previous two questions. Find $\det(A) + \det(B)$:

- a) $1 - 2i$ b) $2 - 2i$ c) $2 - i$ d) $-1 - 2i$ e) $1 - i$

Correct Answer: $2 - 2i$

4. Let F_3 be the Fourier matrix for $N = 3$. What is the $a_{2,2}$ entry of F_3 ? (Recall that we index rows t and columns k in F_3 with $0 \leq t, k \leq 2$.)

- a) $e^{i2\pi/3}$ b) $e^{i4\pi/3}$ c) 0 d) $e^{i\pi}$ e) $e^{i2\pi}$

Correct Answer: $e^{i2\pi/3}$

5. Let F_3 be the Fourier matrix for $N = 3$ with columns \mathbf{u}_k for $k = 0, 1, 2$. Find the complex dot product (or inner product):

$$(\mathbf{u}_0 + \mathbf{u}_1) \bullet \mathbf{u}_2.$$

- a) $e^{i2\pi/3}$ b) $e^{i4\pi/3}$ c) 0 d) $e^{i\pi}$ e) $e^{i2\pi}$

Correct Answer: 0