This is the Diagonalization Gateway test. Passing on this test is ALL FIVE of the five problems on the test.

Problem 1. **(1 point)**

The matrix $A = \begin{bmatrix} 5 & 4 \\ -1 & 0 \end{bmatrix}$ is diagonalizable over $\mathbb{C}$. Find a diagonal matrix D and an invertible matrix S with real or complex entries such that $D = S^{-1}AS$.

$D = \begin{bmatrix} — & — \\ — & — \end{bmatrix}$

$S = \begin{bmatrix} — & — \\ — & — \end{bmatrix}$

Answer(s) submitted:

- $\begin{bmatrix} 4 & 0 \\ 0 & 1 \end{bmatrix}$;--

submitted: (incorrect)
recorded: (incorrect)

Problem 2. **(1 point)**

Identify the diagonalizability of each of the following matrices.

1. $A = \begin{bmatrix} 1 & 0 \\ -3 & 3 \end{bmatrix}$

A is

- ?
- Diagonalizable over real and complex numbers
- Diagonalizable over complex numbers but not reals
- Not diagonalizable over either real or complex numbers
- Diagonalizable over real numbers but not complex numbers

2. $B = \begin{bmatrix} 5 & -4 \\ 1 & 3 \end{bmatrix}$

B is

- ?
- Diagonalizable over real and complex numbers
- Diagonalizable over complex numbers but not reals
- Not diagonalizable over either real or complex numbers
- Diagonalizable over real numbers but not complex numbers

3. $C = \begin{bmatrix} 3 & 4 \\ -1 & 3 \end{bmatrix}$

C is

- ?
- Diagonalizable over real and complex numbers
- Diagonalizable over complex numbers but not reals
- Not diagonalizable over either real or complex numbers
- Diagonalizable over real numbers but not complex numbers

Answer(s) submitted:

- ?
- ?
- ?

submitted: (incorrect)
recorded: (incorrect)

Problem 3. **(1 point)**

Identify the diagonalizability of each of the following matrices.

1. $A = \begin{bmatrix} 6 & -1 \\ 0 & 4 \end{bmatrix}$

A is

• ?
• Diagonalizable over real and complex numbers
• Diagonalizable over complex numbers but not reals
• Not diagonalizable over either real or complex numbers
• Diagonalizable over real numbers but not complex numbers

2. $B = \begin{bmatrix} -1 & 1 \\ -4 & -1 \end{bmatrix}$

B is

• ?
• Diagonalizable over real and complex numbers
• Diagonalizable over complex numbers but not reals
• Not diagonalizable over either real or complex numbers
• Diagonalizable over real numbers but not complex numbers

3. $C = \begin{bmatrix} -1 & 3 \\ -1 & -3 \end{bmatrix}$

C is

• ?
• Diagonalizable over real and complex numbers
• Diagonalizable over complex numbers but not reals
• Not diagonalizable over either real or complex numbers
• Diagonalizable over real numbers but not complex numbers

Answer(s) submitted:

• ?
• ?
• ?

submitted: (incorrect)
recorded: (incorrect)

Problem 4. **(1 point)**

The matrix $A = \begin{bmatrix} -5 & 0 \\ -6 & -6 \end{bmatrix}$ is diagonalizable over $\mathbb{C}$. Find a diagonal matrix D and an invertible matrix S with real or complex entries such that $D = S^{-1}AS$.

$D = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

$S = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

Answer(s) submitted:

• __; __

submitted: (incorrect)
recorded: (incorrect)

Problem 5. **(1 point)**

The matrix $A = \begin{bmatrix} -4 & -1 \\ 27 & 8 \end{bmatrix}$ is diagonalizable over $\mathbb{C}$. Find a diagonal matrix D and an invertible matrix S with real or complex entries such that $D = S^{-1}AS$.

$D = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

$S = \begin{bmatrix} \_\_ & \_\_ \\ \_\_ & \_\_ \end{bmatrix}$

Answer(s) submitted:

• __; __

submitted: (incorrect)
recorded: (incorrect)