

Math 341: Quiz 3

Name:

True/False: If the statement is true, give a brief explanation of why it is. If the statement is false, give a counterexample. Let A and B be matrices, and c be a scalar.

1. [3] The function $f : \mathbb{R} \rightarrow \mathbb{R}$ defined by the rule $f(x) = x + 1$ is a linear function. Hint: write down what it means for a function to be linear.

2. [3] A matrix is symmetric if and only if it is Hermitian. (Recall that a Hermitian matrix is a matrix that is equal to its conjugate transpose.)

3. [3] An upper triangular and symmetric matrix is a diagonal matrix.

4. [3] If A and B are invertible matrices, then $A + B$ is invertible.

Free Response: Show all your work and justify your steps. No credit is given for the correct answer with no justification.

5. [4] Let $A = \begin{bmatrix} 2 & -2 & 1 \\ 0 & 2 & 0 \\ 2 & 0 & 1 \end{bmatrix}$. Find A^{-1} if it exists. Remember, you can verify your answer is correct.

6. [4] Determine the effect of the matrix operator T_A on the points $(\pm 1, \pm 1)$ where A is $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$. Plot the images of the squares with the corners $(\pm 1, \pm 1)$, and explain in words what T_A is doing to the points in \mathbb{R}^2 .