

Quiz 3; Tuesday, September 13
MATH 54 with Ming Gu
GSI: Eric Hallman

Student name:

You have 15 minutes to complete the quiz. Calculators are not permitted.

1. (4 points) Let $A = \begin{bmatrix} 3 & 1 \\ 7 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 0 \\ -4 & 3 & 1 \end{bmatrix}$. Compute the following or state which don't exist.

(a) AB

(b) BA

(c) A^{-1}

(d) An elementary row matrix E that swaps the rows of A

2. (4 points) Suppose A is a 4×7 matrix (i.e. 4 rows and 7 columns) and B is a 7×4 matrix. Of the four matrices A , B , AB , or BA , list **all** that could **possibly** represent a linear transformation that is...

(a) one-to-one and onto

(b) one-to-one but not onto

(c) neither one-to-one nor onto

3. (4 points) Mark each statement as True or False. You do not have to explain your reasoning.

(a) If A is an $n \times n$ matrix and $A\mathbf{x} = \mathbf{e}_j$ is consistent for every $j \in \{1, \dots, n\}$ then A is invertible.
(Note: \mathbf{e}_j is the j -th column of the identity matrix)

(b) If A and B are invertible then AB is also invertible and $(AB)^{-1} = A^{-1}B^{-1}$.

(c) If the columns of an $n \times n$ matrix A span \mathbb{R}^n then the columns are linearly independent.

(d) $B = A^{-1}$ if and only if $AB = BA$.