

Linear Algebra
Quiz 2

Name: _____

You have 10 minutes to complete this quiz. If you have a question raise your hand and remain seated. In order to receive full credit your answer must be **complete**, **legible** and **correct**. Show your work, and give adequate explanations.

1. Show by example that there exist 2×2 matrices A and B such that $AB \neq BA$.

If $A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, then $AB = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = BA$.

2.

- (a) Write down the real matrix M that has the property that, for each $3 \times n$ matrix A , MA is the matrix obtained from A by scaling its middle row by the factor 2.

$$E_{22}(2) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

- (b) Write down the real matrix M that has the property that, for each $3 \times n$ matrix A , MA is the matrix obtained from A by switching its first and last rows.

$$P_{13} = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$

- (c) Write down the real matrix M that has the property that, for each $3 \times n$ matrix A , MA is the matrix obtained from A by adding twice the middle row of A to the first row of A .

$$E_{12}(2) = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$