

Quiz 7, Linear

Name: _____

1. (3 points) The set $M_{2 \times 2}$ is the vector space of all two-by-two matrices with the standard operations of addition and scalar multiplication. Determine if the subset H of all matrices of the form $\begin{bmatrix} a & b \\ 0 & d \end{bmatrix}$ is a subspace of $M_{2 \times 2}$.

2. (4 points) Although a matrix A is not necessarily square, the matrices $A^T A$ and AA^T are always square. Justify that in general $\det(A^T A) \neq (\det AA^T)$ by doing the following: Let

$A = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$. Choose easy values for a, b , and c and then calculate $\det(A^T A)$ and $\det(AA^T)$.

3. (3 points) Find an explicit description of $\text{Nul } A$ by listing vectors that span the null space if

$$A = \begin{bmatrix} 1 & -3 & 0 & 2 & 0 \\ 0 & 0 & 1 & -7 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}.$$