

Review of Linear Algebra: Questions

1. Every plane in \mathbb{R}^n is a subspace of \mathbb{R}^n .

TRUE ☐ FALSE ☐

2. There are 4 linearly independent vectors in \mathbb{R}^3 .

TRUE ☐ FALSE ☐

3. If $Ax = b$ for $A \in \mathbb{R}^{m \times n}$, $x \in \mathbb{R}^n$, and $b \in \mathbb{R}^m$, then b is a linear combination of the columns of A .

TRUE ☐ FALSE ☐

4. If $A^2 = 0$ then A is not invertible.

TRUE ☐ FALSE ☐

5. The rank r of the n by n matrix $A = [a_{ij}]$ where $a_{ij} = i + j$ is $r = n$.

TRUE ☐ FALSE ☐

6. The inverse of a upper triangular matrix is upper triangular.

TRUE ☐ FALSE ☐

7. The sum of two eigenvectors of a matrix A is an eigenvector of A .

TRUE ☐ FALSE ☐

8. Two eigenvectors corresponding to different eigenvalues are linearly independent.

TRUE ☐ FALSE ☐

9. A set of vectors that are pairwise orthogonal can be linearly dependent.

TRUE ☐ FALSE ☐

10. $\det(2AB^{-1}) = 2\det(A)\det(B^{-1})$.

TRUE ☐ FALSE ☐

11. $\det(A + B) = \det(A) + \det(B)$.

TRUE ☐ FALSE ☐

12. if $A = [a_{ij}] \in \mathbb{R}^{3 \times 3}$, and $E = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 0 \\ 0 & 2 & 1 \end{bmatrix}$ then the product EA equals...

☐ the matrix formed by adding twice row 2 to each row of A .

☐ the matrix formed by adding twice column 2 to each column of A .

13. Let $A \in \mathbb{R}^{m \times n}$ represent a linear transformation $\mathcal{A}: \mathcal{V} \mapsto \mathcal{W}$. What is the dimension of \mathcal{V} ? What is the dimension of \mathcal{W} ? Write down the rank-nullity theorem.

14. List all the matrix factorizations that you know.