

Linear Algebra

1. Compute determinants of the following matrices.

a) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ b) $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ c) $\begin{pmatrix} 1 & 2 \\ -2 & -4 \end{pmatrix}$.

Answer.

a) -2 b) $ad - bc$ c) 0.

2. Find all solutions to $A\mathbf{x} = \mathbf{0}$ for

a) $\begin{pmatrix} 1 & 2 \\ -2 & -4 \end{pmatrix}$ b) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$.

Answer.

a) All multiples of $(-2, 1)^T$.

b) $\mathbf{0}$ (zero-vector) only.

3. Which of the following pairs of vectors are linearly independent?

a) $(1, 0)$ and $(1, 1)$

b) $(2, 5)$ and $(1, 3)$

c) $(1, 3)$ and $(-2, -6)$?

Answer.

a) and b), but not c): The pairs in (a) and (b) are not multiples of each other.

In (c) $(-2, -6) = -2(1, 3)$.

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