

Final, MATH 3130 — Solutions to Y/N Questions

10 · 2 = 20 points

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YOUR NAME:

Circle either Y or N (but not both) at the end of each question. No explanation is needed.

1. The columns of A (an $m \times n$ matrix) span $\mathbb{R}^m$ if and only if A has a pivot position in every row. Y
2. The columns of A (an $m \times n$ matrix) are linearly independent if and only if the equation $A\mathbf{x} = \mathbf{0}$ has only the trivial solution. Y
3. A transformation T is linear if and only if $T(\mathbf{u} + \mathbf{v}) = T(\mathbf{u}) + T(\mathbf{v})$ for all $\mathbf{u}, \mathbf{v}$ in the domain of T . N
4. If A , an $n \times n$ matrix, is invertible, then it is row equivalent to the identity matrix I_n . Y
5. For any pair of A, B , $n \times n$ matrices, one has $AB = BA$. N
6. If A , an $n \times n$ matrix, is invertible, then $\dim(\text{Nul}A) = n$. N
7. If A is a triangular matrix, then $\det A$ is the sum of the entries on the main diagonal. N
8. For A , an $n \times n$ matrix, $\det A = \det A^T$. Y
9. A collection of nonzero vectors in $\mathbb{R}^n$ are linearly independent if and only if no vector can be written as a multiple of another vector. N
10. Let $\mathcal{B} = \{\mathbf{b}_1, \dots, \mathbf{b}_n\}$ be a basis for a vector space V . Then the coordinate mapping $\mathbf{x} \mapsto [\mathbf{x}]_{\mathcal{B}}$ is a linear transformation from V onto $\mathbb{R}^n$, but it is not necessarily one-to-one. N