
Linear Algebra Review

Brad Findell and

September 25, 2019

Contents

1 Vocabulary Review

Short-answer, multiple-choice, and select-all questions about key vocabulary.

Question 1 A linear system of equations that has no solutions is said to be inconsistent. With one or more solutions, the system is consistent.

Question 2 Suppose that for matrix E , two conditions hold:

- (a) The first nonzero entry in each row of E is equal to 1. This leading entry 1 is called a pivot.
- (b) The leading entry in the $(i+1)^{st}$ row of E occurs in a column to the right of the column where the leading entry in the i^{th} row occurs.

Then the matrix E is (row) echelon form. (Hint: two words.)

Note: A consequence of this definition is that all rows that are identically zero occur at the (top/ bottom ✓) of the matrix.

Question 3 If an $m \times n$ matrix can be transformed into another by a sequence of elementary row operations, the two matrices are said to be rowequivalent. (Hint: two words.)

Question 4 Suppose that for matrix E , two conditions hold:

- (a) E is in echelon form, and
- (b) in every column of E having a pivot, every entry in that column other than the pivot is 0.

Then E is said to be in reducedechelon form. (Hint: three words.)

1 Vocabulary Review

Question 5 Let A be an $m \times n$ matrix that is row equivalent to a reduced echelon form matrix E . The number of nonzero rows in E is called the rank of A .

Question 6 A mapping $L : \mathbb{R}^n \rightarrow \mathbb{R}^m$ is linear if

(a) $L(x + y) = \text{\span style="border: 1px solid black; padding: 0 2px;">}L(x) + L(y)\text{\span style="border: 1px solid black; padding: 0 2px;}}$ for all $x, y \in \mathbb{R}^n$.

(b) $L(cx) = \text{\span style="border: 1px solid black; padding: 0 2px;">}cL(x)\text{\span style="border: 1px solid black; padding: 0 2px;}}$ for all $x \in \mathbb{R}^n$ and all scalars $c \in \mathbb{R}$.

Question 7 Let j be an integer between 1 and n . The n -vector e_j is the vector that has a 1 in the j^{th} entry and a 0 in every other entry.

Question 8 Given an $n \times n$ matrix A , if there is an $n \times n$ matrix B such that $AB = I_n$ and $BA = I_n$, then A is said to be invertible, and the matrix B is called the inverse of A . If there is no such matrix B , the A is said to be noninvertible, or singular.

Question 9 If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then the determinant of A , $\det(A) = \text{\span style="border: 1px solid black; padding: 0 2px;">}ad - bc\text{\span style="border: 1px solid black; padding: 0 2px;}}$.
