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10.1.3 What You Will Learn

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10.1.3 What You Will Learn

Upon completion of this unit, you should be able to

- Determine when linear systems of equations have a unique solution, an infinite number of solutions, or only approximate solutions.
- Determine the row-echelon form of a system of linear equations or matrix to
 - find the pivots,
 - decide the free and dependent variables,
 - establish specific (particular) and general (complete) solutions,
 - find a basis for the column space, the null space, and row space of a matrix,
 - determine the rank of a matrix, and/or
 - determine the dimension of the row and column space of a matrix.
- Picture and interpret the fundamental spaces of matrices and their dimensionalities.
- Indicate whether vectors are orthogonal and determine whether subspaces are orthogonal.
- Determine the null space and column space for a given matrix and connect the row space of A with the column space of A^T .
- Identify, apply, and prove simple properties of vector spaces, subspaces, null spaces and column spaces.
- Determine when a set of vectors is linearly independent by exploiting special structures. For example, relate the rows of a matrix with the columns of its transpose to determine if the matrix has linearly independent rows.
- Approximate the solution to a system of linear equations of small dimension using the method of normal equations to solve the linear least-squares problem.

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