Solution Sets: Takeaways ⤴

Concepts

- An inconsistent system has two or more equations that no solution exists when the augmented matrix is in reduced echelon form.

    - Example of a inconsistent system:

- When the determinant is equal to zero, we say the matrix is singular or it contains no inverse.

    - Example of a singular matrix:

        - The formula for the determinant of a   square matrix is:

        - If we substitute in the values, we get a determinant of zero:

- A nonhomogenous system is a system where the constants vector ( ) doesn't contain all zeros.

    - Example of a nonhomogenous system:

- A homogenous system is a system where the constants vector ( ) us equal to the zero vector.

    - Example of a omogenous system:

        - A homogenous system always contains the trivial solution: the zero vector.

- For a nonhomogenous system that contains the same number of rows and columns, there are 3 possible solutions:
    - No solution.
    - A single solution.
    - Infinitely many solutions.

- For rectangular (nonsquare, nonhomogenous) systems, there are two possible solutions:
  - No solution.
  - Infinitely many solutions.
- If   is a linear system, then every vector   which satisfies the system is said to be a solution vector of the linear system. The set of solution vectors of the system is called the solution space of the linear system.
- When the solution is a solution space (and not just a unique set of values), it's common to rewrite it into parametric vector form.
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    Example a vector in parametric vector form:

Resources

- [Consistent and Inconsistent equations](#)
- [Solution Spaces of Homogenous Linear Systems](#)