

Rouché–Capelli theorem*

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* Also known as Kronecker–Capelli theorem and Rouché–Frobenius theorem.

In a linear system of equations:

A = Coefficient matrix.

A* = Augmented matrix.

$$\left\{ \begin{array}{l} \text{If } R(A) = R(A^*) \Rightarrow \text{Compatible system} \\ \text{If } R(A) \neq R(A^*) \Rightarrow \text{Incompatible system : No solution.} \end{array} \right. \left\{ \begin{array}{l} \text{If } R(A) = R(A^*) = \text{number of unknowns} \rightarrow \\ \text{Determinate system :} \\ \text{Unique solution.} \\ \text{If } R(A) = R(A^*) < \text{number of unknowns} \rightarrow \\ \text{Indeterminate system :} \\ \text{Infinite solutions.} \end{array} \right.$$

Where $R(x)$ denotes Rank of the x matrix.

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