***LEY DE KIRCHOFF – Numeric Methods***

Strategy to follow:

* Formulate the system of equations: Analyze the electrical circuit and use Kirchhoff's laws and the relationships between currents and voltages in the components to obtain a system of linear equations. Each equation will represent a constraint in the circuit.
* Write the system of equations in matrix form: Transform the system of equations into matrix form, where you will have a coefficient matrix and a vector of independent terms. For example, if you have N unknowns (voltages or currents) in the circuit, you will have an NxN square matrix and a vector of length N.
* Establish an initial approximation: Assign initial values to the unknowns of the system of equations. You can use reasonable values based on your knowledge of the circuit or assign random values.
* Gauss-Seidel iteration: Apply the Gauss-Seidel method iteratively until convergence is reached. In each iteration, follow these steps:

Update each unknown using the current values of the other unknowns and the corresponding coefficients from the matrix.

Repeat this process for all unknowns, updating each one sequentially.

After updating all unknowns, repeat the previous step with the new updated values.

Continue iterating until the values converge within a predefined tolerance criterion.

Circuit:

Diagrama, Esquemático

Descripción generada automáticamente

Diagrama, Esquemático, Gráfico de cajas y bigotes

Descripción generada automáticamente

N = Nodo

M = Malla

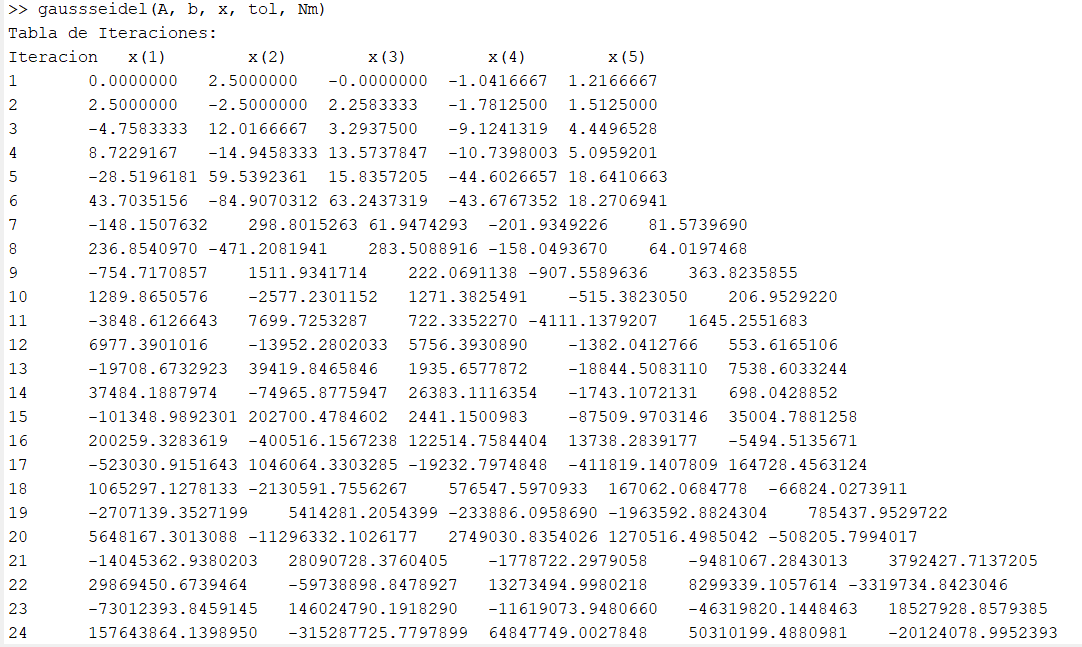
In Matrix:

A = A =

B=

Results and conblusions:

* For the Gauss-Seidel method, we conclude that convergence cannot be guaranteed due to the requirement of diagonal dominance as a necessary condition for ensuring convergence of the method. Therefore, if the matrix does not satisfy this condition, we cannot guarantee convergence of the method. Additionally, it is advisable to try other iterative methods. If the matrix is not diagonally dominant and the Gauss-Seidel method does not converge, it can be helpful to explore other iterative methods. These methods may exhibit better convergence properties in situations where Gauss-Seidel diverges.



1) By testing the provided matrix and vector with the Cholesky method, we can conclude that the system of equations was successfully solved using this technique, and the obtained solution is valid.

Texto, Tabla

Descripción generada automáticamente con confianza media

In the code, we can display the currents passing through the circuit in order, I1, I2, ..., I5.