Numerical Calculation HW3

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1 Jacobi method

Matlab implementation of this algorithm is attached.The Jacobi method is a method of solving a matrix equation on a matrix that has no zeros along its main diagonal. Each diagonal element is solved for, and an approximate value plugged in. The process is then iterated until it converges. This algorithm is a stripped-down version of the Jacobi transformation method of matrix diagonalization.
The equation below shows how iterations work for this method:

$$x_i^{(k+1)} = \frac{1}{a_{ii}} \left(b_i - \sum_{j \neq i} a_{ij} x_j^{(k)} \right), \quad i = 1, 2, \ldots, n.$$

The ruccrance above is the same for x , y and z.
This algorithm iterates until reaches tolerable error already defined

The program takes a number **n** as the number of variables, then it takes n linear equations and n symbolic variable names.
Input :

$$5x - 2y + 3z = -1 \tag{1}$$

$$-3x + 9y + z - 2w = 2 \tag{2}$$

$$3x + y - 7z - 5w = 3 \tag{3}$$

$$4x + 3y - 5z + 7w = 0.5 \tag{4}$$

Output :

$$x = 0.028 \tag{5}$$

$$y = 0.212 \tag{6}$$

$$z = -0.238 \tag{7}$$

$$w = -0.206 \tag{8}$$