數值方法_作業七_E14101082_陳政謙

HW7

Solve the problem

$$4x_1 - x_2 - x_4 = 0$$
$$-x_1 + 4x_2 - x_3 - x_5 = -1$$
$$-x_2 + 4x_3 + x_5 - x_6 = 9$$
$$-x_1 + 4x_4 - x_5 - x_6 = 4$$
$$-x_2 - x_4 + 4x_5 - x_6 = 8$$
$$-x_3 - x_5 + 4x_6 = 6$$

by (a) Jacobi method, (b) Gauss-Seidel method, (c) SOR method, and (d) the conjugate gradient method.

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PS C:\Users\user\Desktop\E14101082_numerical_hw7> cd "c:\Users\user\Desktop\E14101082_
Homework 7 Solutions:

(a) Jacobi Method:
x_jacobi = [ 1.174788, 1.643173, 2.448248, 3.055980, 3.949657, 3.099476 ]
Iterations: 29
L2 Norm of Residual (Ax-b): 0.000003

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(b) Gauss-Seidel Method:
x_gauss_seidel = [ 1.174788, 1.643174, 2.448248, 3.055981, 3.949658, 3.099476 ]
Iterations: 13
L2 Norm of Residual (Ax-b): 0.000001

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(c) SOR Method (omega = 1.200000):
x_sor = [ 1.174788, 1.643173, 2.448248, 3.055980, 3.949658, 3.099476 ]
Iterations: 14
L2 Norm of Residual (Ax-b): 0.000001

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(d) Steepest Descent Method (PDF's 'Conjugate Gradient'):
x_steepest_descent = [ 1.174788, 1.643173, 2.448248, 3.055981, 3.949658, 3.099476 ]
Iterations: 32
L2 Norm of Residual (Ax-b): 0.000001

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