HW7 E94116198 劉翌伶

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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Final Solutions:
Jacobi:            [1.17478856 1.64317357 2.44824809 3.05598066 3.94965767 3.09947643]
Gauss-Seidel:      [1.17478855 1.64317358 2.44824809 3.05598066 3.94965767 3.09947644]
SOR (omega=1.25):  [1.17478857 1.64317359 2.44824808 3.05598068 3.94965767 3.09947644]
Conjugate Gradient: [1.17656665 1.64269366 2.44433267 3.06002082 3.95260785 3.09922059]
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(a)

		1	2
x_1	$\frac{x_2+x_4}{4}$	$\frac{0+0}{4}=0$	$\frac{-\frac{1}{4}+1}{4}=\frac{3}{16}$
x_2	$\frac{-1+x_1+x_3+x_5}{4}$	$\frac{-1+0+0+0}{4}=-\frac{1}{4}$	$\frac{-1+0+\frac{9}{4}+2}{4}=\frac{13}{16}$
x_3	$\frac{9+x_2-x_5+x_6}{4}$	$\frac{9+0-0+0}{4}=\frac{9}{4}$	$\frac{9-\frac{1}{4}-2+\frac{3}{2}}{4}=\frac{33}{16}$
x_4	$\frac{4+x_1+x_5+x_6}{4}$	$\frac{4+0+0+0}{4}=1$	$\frac{4+0+2+\frac{3}{2}}{4}=\frac{15}{8}$
x_5	$\frac{8+x_2+x_4+x_6}{4}$	$\frac{8+0+0+0}{4}=2$	$\frac{8-\frac{1}{4}+1+\frac{3}{2}}{4}=\frac{41}{16}$
x_6	$\frac{6+x_3+x_5}{4}$	$\frac{6+0+0}{4}=\frac{3}{2}$	$\frac{6+\frac{9}{4}+2}{4}=\frac{41}{16}$