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Homework #2

$$-4c_1 - c_2 + 12c_3 = 2350$$
$$-3c_1 + 18c_2 - 6c_3 = 1200$$
$$15c_1 - 3c_2 - c_3 = 3800$$

↓

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Gauss-Seidel

$$x_1 = \frac{b_1 - a_{12}x_2 - a_{13}x_3}{a_{11}}$$

$$x_2 = \frac{b_2 - a_{21}x_1 - a_{23}x_3}{a_{22}}$$

$$x_3 = \frac{b_3 - a_{31}x_1 - a_{32}x_2}{a_{33}}$$

$$|\varepsilon_a| = \left| \frac{x_i^j - x_i^{j-1}}{x_i^j} \right| 100\% < \varepsilon_s$$

(a)

1st Iteration

$x_1 = \frac{1}{15}(3800 + 3x_2 + x_3)$

$x_2 = \frac{1}{18}(1200 + 3x_1 + 6x_3)$ →

$x_3 = \frac{1}{12}(2350 + 4x_1 + x_2)$

$\frac{1}{15}(3800 + 3(0) + (0)) = 253.33$

$\frac{1}{18}(1200 + 3(253.33) + 6(0) = 108.89$

$\frac{1}{12}(2350 + 4(253.33) + (108.89)) = 289.35$

$\frac{1}{15}(3800 + 3(108.89) + 289.35) = 294.4$

$\frac{1}{18}(1200 + 3(294.4) + 6(289.35) = 212.18$

$\frac{1}{12}(2350 + 4(294.4) + (212.18)) = 311.65$

↓

$\frac{1}{15}(3800 + 3(223.31) + 319.96) = 319.33$

$\frac{1}{18}(1200 + 3(319.33) + 6(319.96)) = 226.54$

$\frac{1}{12}(2350 + 4(319.33) + 226.54) = 321.55$

↓

$\frac{1}{15}(3800 + 3(226.54) + 321.55) = 280.07$

$\frac{1}{18}(1200 + 3(280.07) + 6(321.55)) = 220.53$

$\frac{1}{12}(2350 + 4(280.09) + 220.53) = 307.57$

$$|\varepsilon_{a,i}| = \left| \frac{x_i^j - x_i^{j-1}}{x_i^j} \right| 100\% < \varepsilon_s$$

$\varepsilon_s = 5\%$

$1/15(3800 + 3(220.53) + 307.57) = 317.94$
$1/18(1200 + 3(317.94) + 6(307.57)) = 222.18$
$1/12(2350 + 4(317.94) + 226.18) = 303.99$

$1/15(3800 + 3(222.18) + 303.99) = 318.03$
$1/18(1200 + 3(318.03) + 6(303.99)) = 221$
$1/12(2350 + 4(318.03) + 221) = 320.26$

$\frac{318.03 - 317.94 - 1}{318.03} \times 100$

✓ $.286\% < 5\%$

✓ $.081 = \left| \frac{222.18 - 221 - 1}{221} \right| \times 100$

$\left| \frac{320.26 - 303.99 - 1}{320.26} \right| \times 100 = 4.77\%$ ✓