

Let the initial conditions be $x=0, y=0, z=0$.

First iteration:-

$$x^{(1)} = \frac{1}{20} [17 - 0 + 0] = 0.85$$

$$y^{(1)} = \frac{1}{20} [-18] = -0.9$$

$$z^{(1)} = \frac{1}{20} [25] = 1.25$$

Second iteration:-

$$x^{(2)} = \frac{1}{20} [17 - y^{(1)} + 2z^{(1)}]$$

$$= \frac{1}{20} [17 - (-0.9) + 2(1.25)] = 1.02$$

$$y^{(2)} = \frac{1}{20} [-18 - 3x^{(1)} + z^{(1)}]$$

$$= \frac{1}{20} [-18 - 3(0.85) + 1.25] = -0.965$$

$$z^{(2)} = \frac{1}{20} [25 - 2x^{(1)} + 3y^{(1)}]$$

$$= \frac{1}{20} [25 - 2(0.85) + 3(-0.9)] = 1.03$$

17. Solve by Gauss seidal method $x - 2y = -3$,

$2x + 25y = 15$ correct to 4 decimal places.

Solution:-

$$x - 2y = -3$$

$$2x + 25y = 15$$

$$x = -3 + 2y$$

$$y = \frac{1}{25} [15 - 2x]$$

Let the initial value $y=0$.

First iteration:-

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$$x^{(1)} = -3 + 0 = -3$$

$$y^{(1)} = \frac{1}{25} [15 + 6] = 0.84$$

Second iteration:

$$x^{(2)} = -3 + 2y^{(1)} = -3 + 2(0.84) = -1.32$$

$$y^{(2)} = \frac{1}{25} [15 - 2x^{(2)}] = \frac{1}{25} [15 - 2(-1.32)] = 0.7056$$

Third iteration:

$$x^{(3)} = -3 + 2y^{(2)} = -3 + 2(0.7056) = -1.5888$$

$$y^{(3)} = \frac{1}{25} [15 - 2x^{(3)}] = \frac{1}{25} [15 - 2(-1.5888)] = 0.7271$$

Fourth iteration:

$$x^{(4)} = -3 + 2y^{(3)} = -3 + 2(0.7271) = -1.5458$$

$$y^{(4)} = \frac{1}{25} [15 - 2x^{(4)}] = \frac{1}{25} [15 - 2(-1.5458)] = 0.7237$$

Fifth iteration:

$$x^{(5)} = -3 + 2y^{(4)} = -3 + 2(0.7237) = -1.5526$$

$$y^{(5)} = \frac{1}{25} [15 - 2x^{(5)}] = \frac{1}{25} [15 - 2(-1.5526)] = 0.7242$$

Sixth iteration:

$$x^{(6)} = -3 + 2y^{(5)} = -3 + 2(0.7242) = -1.5516$$

$$y^{(6)} = \frac{1}{25} [15 - 2x^{(6)}] = \frac{1}{25} [15 - 2(-1.5516)] = 0.7241$$

Seventh iteration:

$$x^{(7)} = -3 + 2y^{(6)} = -3 + 2(0.7241) = -1.5518$$

$$y^{(7)} = \frac{1}{25} [15 - 2x^{(7)}] = \frac{1}{25} [15 - 2(-1.5518)] = 0.7241$$