MD. Shakil Hossain
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Answer to the question no – 2

Consider the system of linear equation

$$2x_1 + 7x_2 + x_3 = 19$$
$$4x_1 + x_2 - x_3 = 3$$
$$x_1 - 3x_2 + 12x_3 = 31$$

The coefficient matrix of the given system is not diagonally dominant.

Required condition

$$|a_1| > |b_1| + |c_1|$$
$$|b_2| > |a_2| + |c_2|$$
$$|c_3| > |a_3| + |b_3|$$

We re arrange the equations as follows such that the elements in the coefficient matrix are diagonally dominant

$4x_1 + x_2 - x_3 = 3$

$2x_1 + 7x_2 + x_3 = 19$

$x_1 - 3x_2 + 12x_3 = 31$

Solving equation for x_1, x_2, z,

$$x = \frac{1}{4}[3 - x_2 + x_3]$$

$$y = \frac{1}{7}[19 - 2x_1 - x_3]$$

$$z = \frac{1}{12}[31 - x_1 + 3x_2]$$

1st Approximation

$$x_1 = \frac{1}{4}[3 - 0 + 0] = \frac{3}{4} = 0.75$$

$$y_1 = \frac{1}{7}[19 - 0 - 0] = \frac{19}{7} = 2.7143$$

$$z_1 = \frac{1}{12}[31 - 0 + 0] = \frac{31}{12} = 2.5833$$

2nd Approximation

$$x_2 = \frac{1}{4}[3 - 2.7143 - 2.5833] = 0.7173$$

$$y_2 = \frac{1}{7}[19 - 2\times 0.75 - 2.5833] = 2.31$$

$$z_2 = \frac{1}{12}[31 - 0.75 + 3(2.5833)] = 3.1994$$

8th Approximation

~~$x_8 = \frac{1}{4}[3 - 2.0002 + 2.9997]$~~

~~$y_8 = \frac{1}{7}[19 - 2(1.001$~~

$x_8 = 0.9999$

$y_8 = 2$

$z_8 = 3.0001$

$\therefore x = 0.9999 \cong 1$

$y = 2 \cong 2$

$z = 3.0001 \cong 3$ Ans

Answer to the question on-1

using $n=5$ approximate the integiam

$$\int_0^1 \sqrt{x^2+1}\, dx$$

$$h = \frac{1-0}{5} = 0.2$$

	x_0	x_1	x_2	x_3	x_4	x_5
x	0	0.2	0.4	0.6	0.8	1
$\sqrt{x^2+1}$	1	1.02	1.08	1.17	1.28	1.41
	y_0	y_1	y_2	y_3	y_4	y_5

$$\int_0^1 \sqrt{x^2+1}\, dx = \frac{h}{2}\{(y_0+y_5)+2(y_1+y_2+y_3+y_4)\}$$

$$= \frac{0.2}{2}\{(1+1.41)+2(1.02+1.08+1.17+1.28)\}$$

$$= \frac{0.2}{2}(2.41+9.1)$$

$$= \frac{0.2}{2} \times 11.51$$

$$= 1.151$$

Ans.