Sub:

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14. $9x+5y+3z=20$

$5x+4y-7z=21$

$3x+9y+4z=16$

$\Rightarrow R_1' = \frac{R_1}{9}$

$R_2' = \frac{R_2}{5}$

$R_3' = \frac{R_3}{3}$

$$\left(\begin{array}{ccc|c} 9 & 5 & 3 & 20 \\ 5 & 4 & -7 & 21 \\ 3 & 9 & 4 & 16 \end{array}\right)$$

$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 0.55 & 0.33 & 2.22 \\ 1 & 0.8 & -1.4 & 4.2 \\ 1 & 3 & 1.33 & 5.33 \end{array}\right)$$

$\Rightarrow R_2' = R_1 - R_2$

$R_3' = R_1 - R_3$

$$\left(\begin{array}{ccc|c} 1 & 0.55 & 0.33 & 2.22 \\ 0 & -0.25 & 1.73 & -1.98 \\ 0 & -2.45 & -1 & -3.11 \end{array}\right)$$

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$$\Rightarrow \left(\begin{array}{ccc|c} 1 & 0.55 & 0.33 & 2.22 \\ 0 & -2.45 & -1 & -3.11 \\ 0 & -0.25 & 1.73 & -1.98 \end{array}\right)$$

$$\Rightarrow R_2' = \frac{R2}{-2.45}$$

$$R_3' = \frac{R3}{-0.25}$$

$$\left(\begin{array}{ccc|c} 1 & 0.55 & 0.33 & 2.22 \\ 0 & 1 & 0.41 & 1.27 \\ 0 & 1 & -6.92 & 7.92 \end{array}\right)$$

$$\Rightarrow R_3' = R_2 - R_3 \quad \left(\begin{array}{ccc|c} 1 & 0.55 & 0.33 & 2.22 \\ 0 & 1 & 0.41 & 1.27 \\ 0 & 0 & 7.33 & -6.65 \end{array}\right)$$

Backward substitution:

$$7.328z = -6.65$$

$$\Rightarrow z = -0.91$$

$$y + 0.41z = 1.27$$

$$\Rightarrow y = 1.64$$

$$x + 0.55y + 0.33z = 2.22$$

$$\Rightarrow x = 1.618$$

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1. e) $6x+5y-8z=24$, $x_0=1$, $y_0=1.5$, $z_0=-1$

$10x+3y+9z=11$

$8y+3z=10$

$\Rightarrow$ $10x+3y+9z=11$

$8y+3z=10$

$6x+5y-8z=24$

$E_1-E_3 \Rightarrow$ $10x+3y+9z=11$

$8y+3z=10$

$4x-2y+12z=-13$

Here, $x_{n+1}=\frac{1}{10}(11-3y_n-9z_n)$

$y_{n+1}=\frac{1}{8}(10-3z_n)$

$z_{n+1}=\frac{1}{12}(-13-4x_{n+1}+2y_{n+1})$

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For, $n=0$, $x_1 = 1.05$

$y_1 = 1.75$

$z_1 = -1.1416$

For, $n=1$. $x_2 = 0.009$

$y_2 = 0.5225$

$z_2 = -0.9988$

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c. $x^9 - 2x - 5 = 0$; $[0, 2]$

$f(x) = x^9 - 2x - 5$

$f(0) = -5$

$f(2) = 7$

updated first time,

$c = \frac{0+2}{2} = 1$, $f(1) = -6$

$[1, 2]$

updated 2nd time, $c = \frac{3}{2} = 1.5$, $f(1.5) = -2.93$

$[1.5, 2]$

Updated 3rd time, $c = \frac{1.5+2}{2} = 1.75$

$f(1.75) = 0.87$

$[1.5, 1.75]$

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1. i) Divided difference table:

x	f(x)	$f^1[\,]$	$f^2[\,]$	$f^3[\,]$
1	3			
3	5	1		
4	21	16	5	
7	201	60	16	2

ii) $f(x) = 3 + 1(x-1) + 5(x-1)(x-3) + 2(x-1)(x-3)(x-4)$

$\therefore f(2) = 3 + (2-1) + 5(2-1)(2-3) + 2(2-1)(2-3)(2-4)$

$= 3 + 1 - 5 + 2$

$= 1$

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