Lecture-17

Monday, September 5, 2022





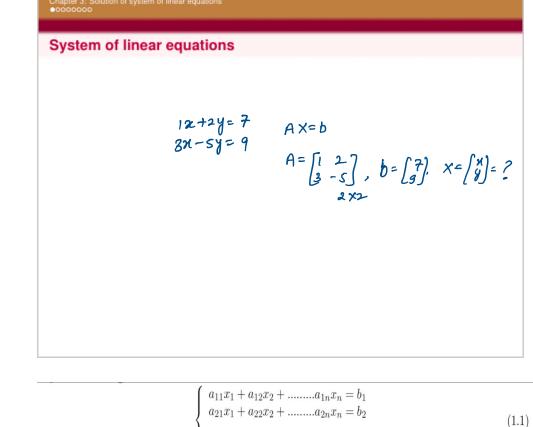
Lecture-17

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Lecture 17: Numerical Analysis (UMA011)

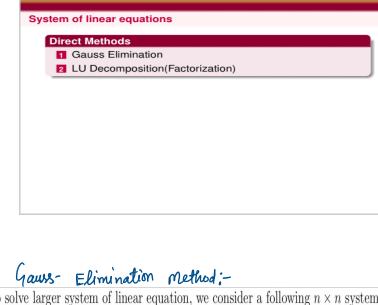
Dr. Meenu Rani

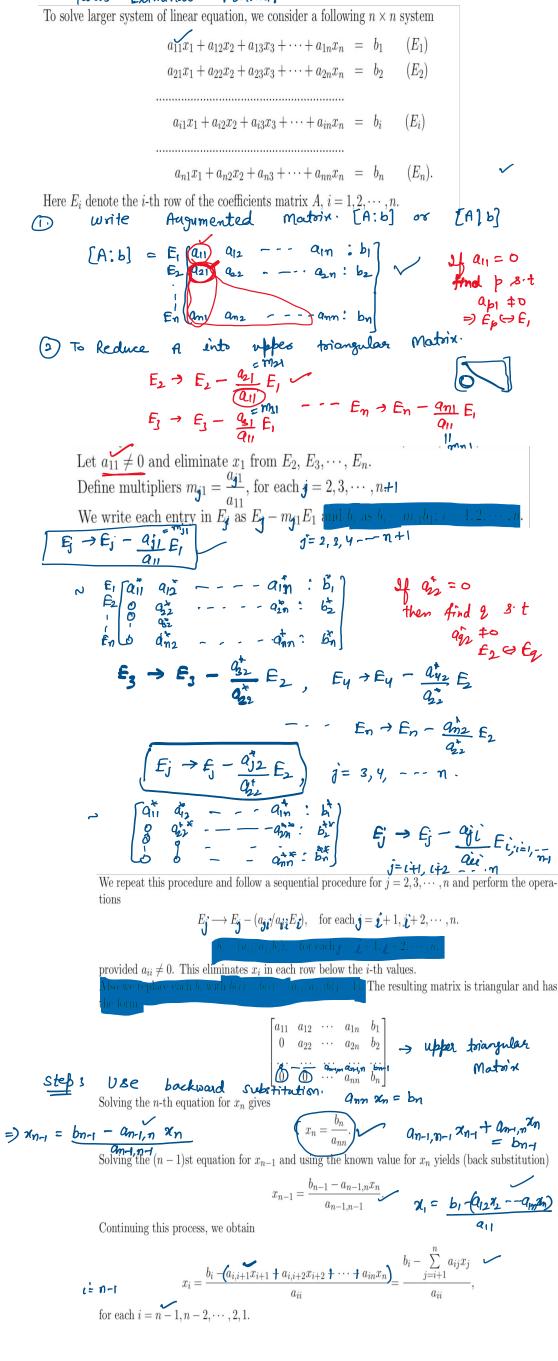
School of Mathematics
TIET, Patiala
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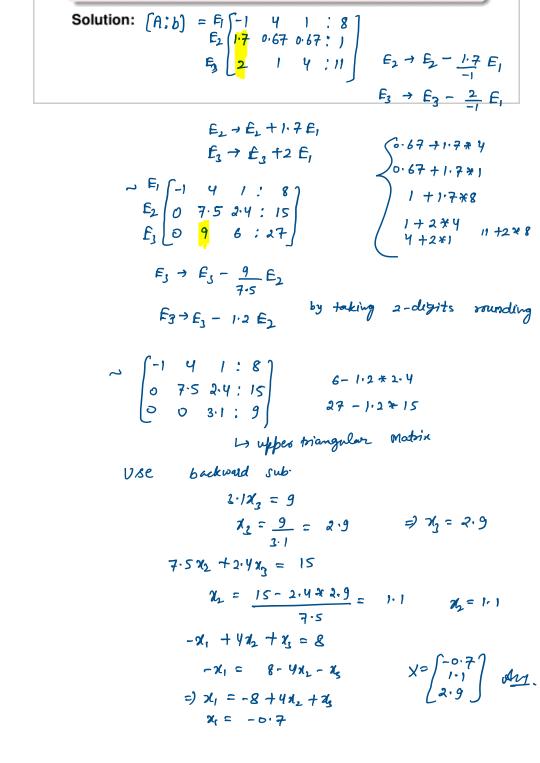
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This is a linear system of n equation in n unknowns x_1, x_2, \dots, x_n. This system can simply be written in the matrix equation form
Ax = b
A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \times \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = \begin{bmatrix} b_1 \\ b_2 \\ \vdots \\ b_n \end{bmatrix}
(1.2)
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Use Gaussian elimination with backward substitution and two-digit rounding arithmetic to solve the following linear

 $-x_1 + 4x_2 + x_3 = 8$ $\frac{5}{3}x_1 + \frac{2}{3}x_2 + \frac{2}{3}x_3 = 1$

system. (The exact solution to each system is

System of linear equations

 $x_1 = -1, x_2 = 1, x_3 = 3.$

Example

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Using four-digit arithmetic operations, solve the following system of equations by Gaussian elimination 0.729x_1 + 0.81x_2 + 0.9x_3 = 0.6867
x_1 + x_2 + x_3 = 0.8338
1.331x_1 + 1.21x_2 + 1.1x_3 = 1.000.
This system has exact solution, rounded to four places x_1 = 0.2245, x_2 = 0.2814, x_3 = 0.3279. Compare your answers!
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System of linear equations: