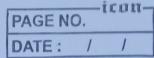
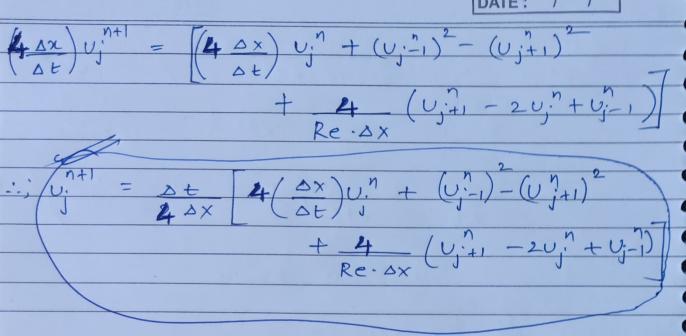
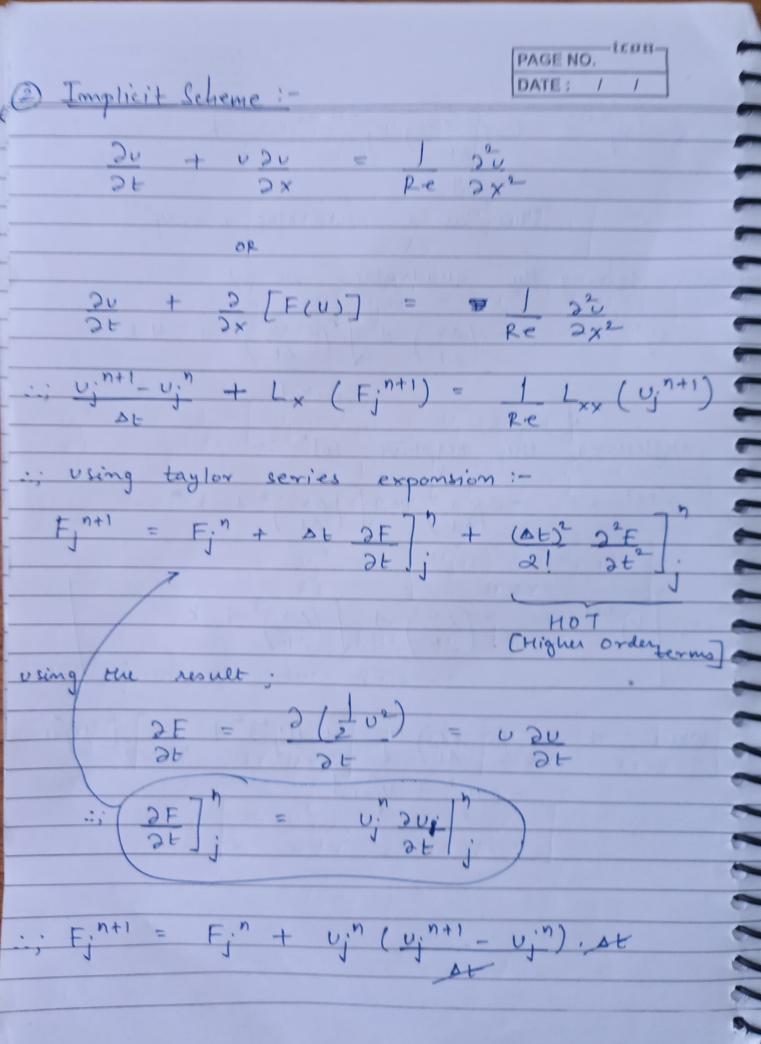
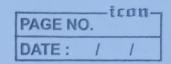


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$$F^{n+1} = F^{n} + v^{n} v^{n+1} - (v^{n})^{2}$$

we already know that
$$F_j^n = (U_j^n)^2$$

$$F^{n+1} = F^n + v^n v^{n+1} - 2F^n$$

$$= -F_{j}^{n} + U_{j}^{n} U_{j}^{n+1}$$

:;
$$L \times (F_{j}^{n+1}) = L \times (-F_{j}^{n} + v_{j}^{n} v_{j}^{n+1}).$$

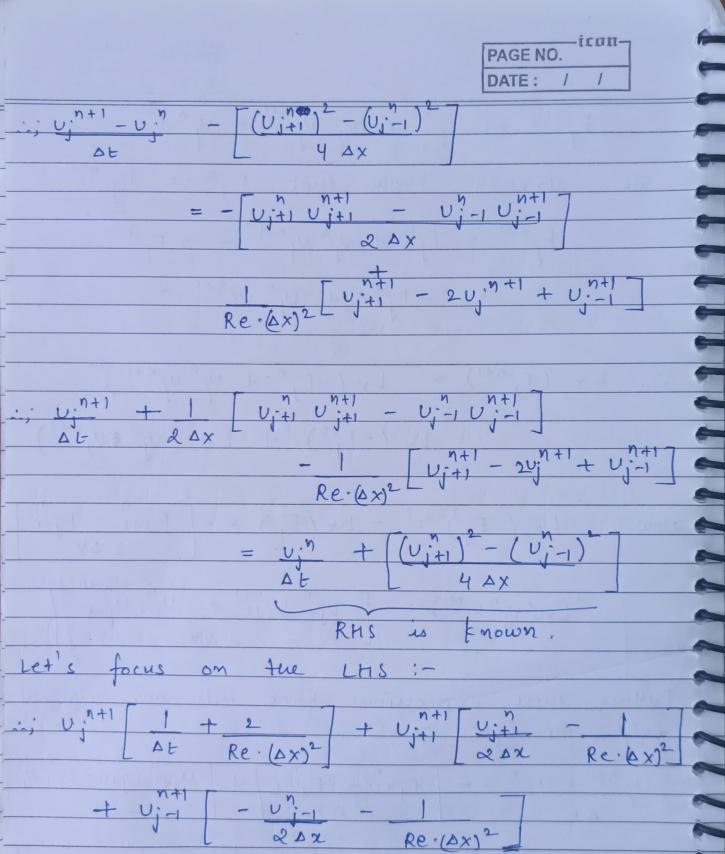
Now;
$$L_{x}(-F_{j}) = -L_{x}(F_{j}) = -\begin{bmatrix} F_{j+1} - F_{j-1} \\ 2\Delta x \end{bmatrix}$$

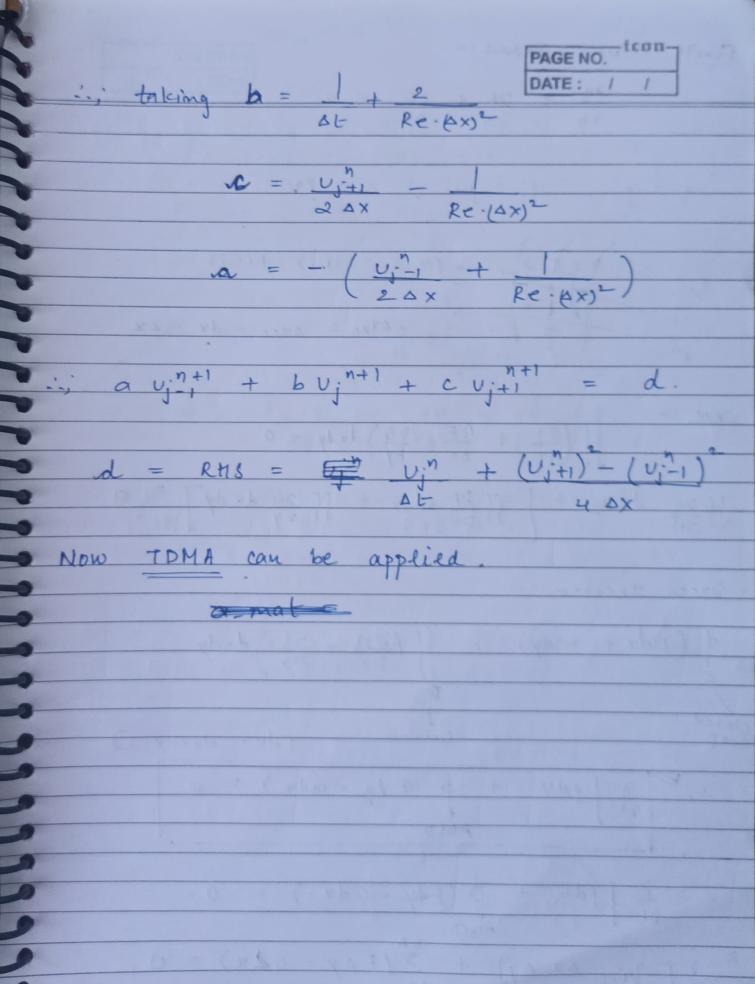
$$L_{x}(U_{j}^{n}U_{j}^{n+1}) = \begin{bmatrix} U_{j+1}^{n}U_{j+1}^{n+1} - U_{j-1}^{n}U_{j-1}^{n+1} \\ 2\Delta x \end{bmatrix}$$

Putting these expressions back into our original

$$= \int \left[U_{j+1}^{n+1} - 2U_{j}^{n+1} + U_{j-1}^{n+1} \right]$$

$$Re \left[(\Delta x)^{2} \right]$$





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3 Crank - Nicolson:

$$\frac{\partial u}{\partial t} + \frac{\partial}{\partial x} \left[F(u) \right] = \frac{1}{2} \frac{\partial^2 u}{\partial x^2}$$

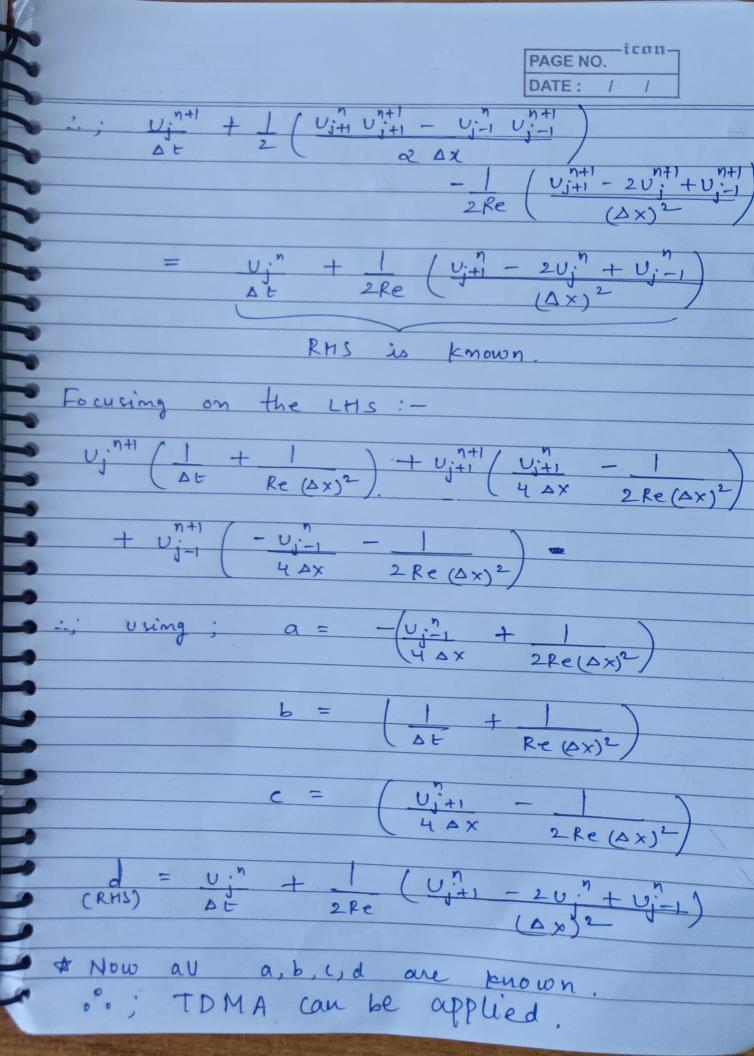
$$\frac{1}{2} \frac{1}{2} \frac{1}$$

$$= \frac{1}{Re} L_{xx} \left(U_j^{n+1} + U_j^{n} \right)$$

using the previous result used in implicit

$$F_j + F_j^{n+1} = F_j^{n} + v_j^{n} \Delta v_j^{n+1} + F_j$$

$$= \underbrace{U_{j}^{n} + 1}_{\Delta t} \underbrace{L_{xx}(U_{j}^{n})}_{2Re}$$



PAGE NO. DATE: / / Analysial tol":-= Integrated using MATLAB!