2a) Matrix Equation

$$\underset{\in \mathbb{R}^{m^2 \times m^2}}{\underline{\underline{A}}}\ \underset{\in \mathbb{R}^{m^2}}{\underline{U}} = \underset{\in \mathbb{R}^{m^2}}{\underline{F}}$$

$$\underline{\underline{A}} = \frac{1}{h^2}\begin{bmatrix} T & D & & \\ D & T & D & \\ & \ddots & \ddots & D \\ & & D & T \end{bmatrix} \quad \text{where} \quad T = \begin{bmatrix} 4 & -1 & & \\ -1 & 4 & \ddots & -1 \\ & \ddots & -1 & 4 \end{bmatrix} \in \mathbb{R}^{m \times m}$$

$$D = \begin{bmatrix} -1 & & \\ & -1 & \\ & & \ddots & -1 \end{bmatrix} \in \mathbb{R}^{m \times m}$$

$$\underline{U} = \begin{bmatrix} U^{[1]} \\ U^{[2]} \\ \vdots \\ U^{[m]} \end{bmatrix} = \begin{bmatrix} \begin{pmatrix} U_{1,1} \\ U_{2,1} \\ \vdots \\ U_{m,1} \end{pmatrix} \\ \vdots \\ \begin{pmatrix} U_{1,m} \\ U_{2,m} \\ \vdots \\ U_{m,m} \end{pmatrix} \end{bmatrix}$$

$$\underline{F} = \begin{bmatrix} F^{[1]} \\ F^{[2]} \\ \vdots \\ F^{[m]} \end{bmatrix} = \begin{bmatrix} \left(\left.\begin{matrix} f_{1,1} + \boxed{\frac{g(0,hj)}{h^2}} \\ f_{2,1} \\ \vdots \\ f_{m,1} + \boxed{\frac{g((m+1)h,hj)}{h^2}} \end{matrix}\right\} + \frac{g(hi,0)}{h^2} \right) \\ \vdots \qquad \vdots \\ \left(\left.\begin{matrix} f_{1,m} + \boxed{\frac{g(0,hj)}{h^2}} \\ f_{2,m} \\ \vdots \\ f_{m,m} + \boxed{\frac{g((m+1)h,hj)}{h^2}} \end{matrix}\right\} + \frac{g(hi,(m+1)h)}{h^2} \right) \end{bmatrix}$$

Note: $\boxed{}$ added to all $f_{1,j}$

and $\boxed{}$ added to all $f_{m,j}$