

Numerical Methods Lab 8.

3.3 $S_0''(x_0) = S_{n-1}''(x_n) = 0 \Rightarrow M_0 = M_N = 0$

- $$M_{i-1} \left(\frac{1}{12} \right) + M_i \left(\frac{1}{3} \right) + M_{i+1} \left(\frac{1}{12} \right) = \frac{y_{i+1} - 2y_i + y_{i-1}}{2h^2}$$

$$M_0 \left(\frac{1}{12} \right) + M_1 \left(\frac{1}{3} \right) + M_2 \left(\frac{1}{12} \right) = \frac{y_2 - 2y_1 + y_0}{2h^2}$$

$$M_1 \left(\frac{1}{12} \right) + M_2 \left(\frac{1}{3} \right) + M_3 \left(\frac{1}{12} \right) = \frac{y_3 - 2y_2 + y_1}{2h^2}$$

$$\begin{bmatrix} \frac{1}{12} & \frac{1}{3} & \frac{1}{12} & 0 & 0 & \dots \\ 0 & \frac{1}{12} & \frac{1}{3} & \frac{1}{12} & 0 & \dots \\ 0 & 0 & \frac{1}{12} & \frac{1}{3} & \frac{1}{12} & \dots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{bmatrix} \cdot \begin{bmatrix} 0 \\ M_1 \\ M_2 \\ \vdots \\ 0 \end{bmatrix} = \begin{bmatrix} y_{i+1} - 2y_i + y_{i-1} \\ y_2 - 2y_1 + y_0 \\ y_3 - 2y_2 + y_1 \\ \vdots \end{bmatrix} / 2h^2$$