$$S = \min \sum_{i=1}^{n} (ax_i^2 + bx_i + c - y_i)^2 \tag{1}$$

$$\frac{\partial S}{\partial a} = \sum_{i=1}^{n} \cancel{2}(ax_i^2 + bx_i + c - y_i)x_i^2 = 0 \tag{2}$$

$$\frac{\partial S}{\partial a} = \sum_{i=1}^{n} (ax_i^2 + bx_i + c)x_i^2 - \sum_{i=1}^{n} x_i^2 y_i = 0 \tag{3}$$

$$\frac{\partial S}{\partial a} = a \sum_{i=1}^{n} ax_i^4 + b \sum_{i=1}^{n} x_i^3 + c \sum_{i=1}^{n} x_i^2 = \sum_{i=1}^{n} x_i^2 y_i \tag{4}$$

$$\hat{\mathrm{y}}_{T+1} = y_N + \frac{y_N - y_S}{t_N - t_S}(t_{N+1} - t_N) \tag{5}$$

$$\begin{bmatrix} \sum_{i=1}^{n} x_i^4 & \sum_{i=1}^{n} x_i^3 & \sum_{i=1}^{n} x_i^2 \\ \sum_{i=1}^{n} x_i^3 & \sum_{i=1}^{n} x_i^2 & \sum_{i=1}^{n} x_i \\ \sum_{i=1}^{n} x_i^2 & \sum_{i=1}^{n} x_i & n \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} \sum_{i=1}^{n} x_i^2 y_i \\ \sum_{i=1}^{n} x_i y_i \\ \sum_{i=1}^{n} y_i \end{bmatrix}$$