Ex.: (1) find IP through $(x_0, y_0) = (1, 2)$

$(x_1, y_1) = (3, 5)$

$(x_2, y_2) = (4, 4)$

So we have to find the coefficients c_0, c_1, c_2 of the IP $p_2(x) = c_0 + c_1 x + c_2 x^2$ fulfilling the ICs:

$$p_2(x_0) = p_2(1) = c_0 + c_1 + c_2 = 2$$

$$p_2(x_1) = p_2(3) = c_0 + 3c_1 + 9c_2 = 5$$

$$p_2(x_2) = p_2(4) = c_0 + 4c_1 + 16c_2 = 4$$

Or as

$$\begin{pmatrix} 1 & 1 & 1 \\ 1 & 3 & 9 \\ 1 & 4 & 16 \end{pmatrix} \begin{pmatrix} c_0 \\ c_1 \\ c_2 \end{pmatrix} = \begin{pmatrix} 2 \\ 5 \\ 4 \end{pmatrix}$$

Solving this LSE gives

$$c_0 = -2, \quad c_1 = \frac{29}{6}, \quad c_2 = -\frac{5}{6}$$

MATLAB: - `p = polyfit(x, y, n)`

- `x`: nodes
- `y`: data
- `n`: degree
- `p`: vector containing the coefficients

- convenient evaluation by `polyval`