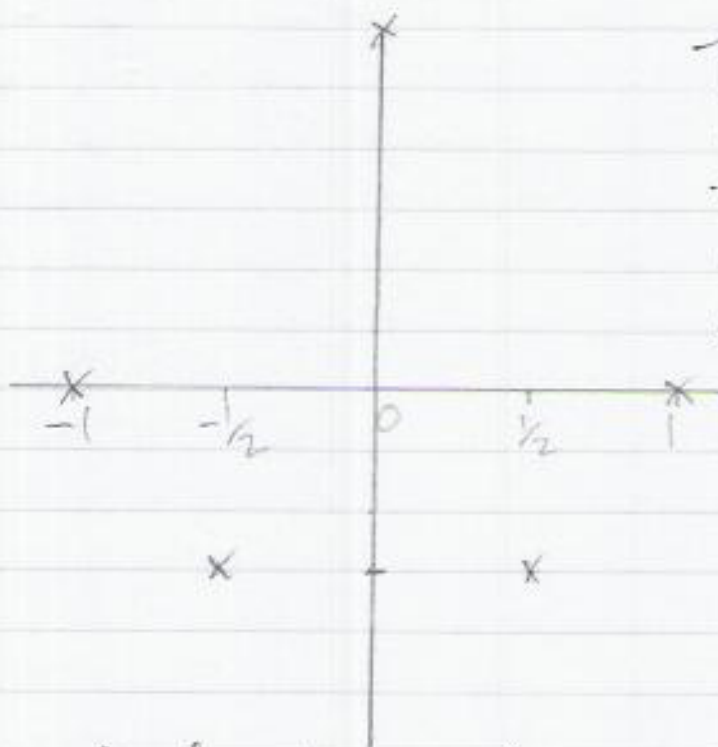


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1) i)



The data is even about zero, which implies the quadratic spline will be even.

To find the cubic spline we solve the system.

$$\begin{bmatrix} 4 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 4 \end{bmatrix} \begin{bmatrix} s''(-\frac{1}{2}) \\ s''(0) \\ s''(\frac{1}{2}) \end{bmatrix} = \frac{6}{(\frac{1}{2})^2} \begin{bmatrix} f(0) - 2f(-\frac{1}{2}) + f(-1) \\ f(\frac{1}{2}) - 2f(0) + f(-\frac{1}{2}) \\ f(1) - 2f(\frac{1}{2}) + f(0) \end{bmatrix}$$

$$= 24 \begin{bmatrix} 1 + 1 + 0 \\ 0 - 2 + \frac{1}{2} \\ 0 + 1 + 1 \end{bmatrix} = \begin{bmatrix} 48 \\ -72 \\ 48 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 1 & 0 & 48 \\ 1 & 4 & 1 & -72 \\ 0 & 1 & 4 & 48 \\ 1 & \frac{1}{4} & 0 & 12 \\ 1 & 4 & 1 & -72 \\ 0 & 1 & 4 & 48 \\ 1 & \frac{1}{4} & 0 & 12 \\ 0 & \frac{15}{4} & 1 & -84 \\ 0 & 1 & 4 & 48 \\ 1 & \frac{1}{4} & 0 & 12 \\ 0 & 1 & \frac{4}{15} & -\frac{113}{5} \\ 0 & 1 & 4 & 48 \end{bmatrix}$$

We now reduce the system.

$R_1 \div 4$

$R_2 - R_1$

$R_2 \times \frac{4}{15}$