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$$\left[\begin{array}{cccc} 1 & 1 & 0 & 6 \\ 1 & 6 & 1 & 48 \\ 0 & 1 & 1 & 18 \end{array}\right] \begin{array}{l} R1\times 6 \\ R2\times 24 \\ R3\times 6 \end{array}$$

$$\left[\begin{array}{cccc} 1 & 1 & 0 & 6 \\ 0 & 5 & 1 & 42 \\ 0 & 1 & 1 & 18 \end{array}\right] \begin{array}{l} R1 \\ R2-R1 \\ \end{array}$$

$$\left[\begin{array}{cccc} 1 & 0 & -1/5 & -12/5 \\ 0 & 1 & 1/5 & 42/5 \\ 0 & 0 & 4/5 & 48/5 \end{array}\right] \begin{array}{l} R1-1/5R2 \\ R2/5 \\ R3-1/5R2 \end{array}$$

$$\left[\begin{array}{cccc} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 12 \end{array}\right] \begin{array}{l} 1/4R3+R1 \\ R2-1/4R3 \\ 5/4R3 \end{array}$$

Hence $\lambda_{-2}=0, \lambda_{-1}=6, \lambda_0=12$

Then $6B_{-1}(x)+12B_0(x)$ fits the data.

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5) i) $p(x)=a+bx+cx^2$

$f(0)=a$ ①

$f(1)=a+b+c$ ②

$f'(1/4)=b+1/2c$ ③

② − ① ⇒ $f(1)-f(0)=b+c$ ④

④ − ③ $f(1)-f(0)-f'(1/4)=c/2$

$2\times$③ − ④ $2f'(1/4)-f(1)+f(0)=b$

Then $p(x)=f(0)+(2f'(1/4)+f(0)-f(1))x+2(f(1)-f(0)-f'(1/4))x^2$

$p(-1)=f(0)-(2f'(1/4)+f(0)-f(1))+2(f(1)-f(0)-f'(1/4))$

$=-2f(0)+3f(1)-4f'(1/4)$

ii) Define $Lf=f(-1)-p(-1)$

$=f(-1)+2f(0)-3f(1)+4f'(1/4)$

$K(\theta)=\frac{1}{2!}L_x((x-\theta)_+)$