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Q1)

opt 2:

a)

$$L_0(x) = \frac{x-x_1}{x_0-x_1} \cdot \frac{x-x_2}{x_0-x_2} \cdot \frac{x-x_3}{x_0-x_3} = \frac{x-0}{-2-0} \cdot \frac{x-1}{-2-1} \cdot \frac{x-3}{-2-3}$$

$$= \frac{x}{-2} \cdot \frac{x-1}{-3} \cdot \frac{x-3}{-5}$$

$$= \frac{x \cdot (x-1) \cdot (x-3)}{-30}$$

$$L_1(x) = \frac{x+2}{2} \cdot \frac{x-1}{-1} \cdot \frac{x-3}{-3} = \frac{(x+2)(x-1)\cdot(x-3)}{6}$$

$$L_2(x) = \frac{x+2}{\frac{1+2}{3}} \cdot \frac{x}{1} \cdot \frac{x-3}{\frac{1-3}{-2}} = \frac{(x+2)(x)(x-3)}{-6}$$

$$L_3(x) = \frac{x+2}{5} \cdot \frac{x}{3} \cdot \frac{(x-1)}{2} = \frac{(x+2) \times (x-1)}{30}$$

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b)

$$-27.\frac{x.(x-1)(x-3)}{-30} + \frac{-1.(x+2)(x-1)(x-3)}{6} + \frac{1.(x+2).x.(x-1)}{30}$$

$$f(3) = 0 + 0 + \frac{5.3.2}{30} = 1$$

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Q2)

Opt 2:

a)

	$f[x_0]$	$f[x_0,x_1]$	$f[x_0,x_1,x_2]$
1	1	$\frac{3-1}{3-1}=1$	
3	3	$\frac{7-3}{7-5}=2$	$\frac{2-1}{5-1}=\frac{1}{4}$
5	7		

(coefficients of polynomial)

$$P(x)=1+1.(x-1)+\frac{1}{4}(x-1)(x-3)$$

$$1+(x-1)+\frac{x^2-4x+3}{4}$$

$$\frac{x^2-4x+3}{4}+x=\frac{x^2+3}{4}$$

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Q2)

Opt2

b)

		f[x0,x1)		
1	1	$\frac{3-1}{3-1}=1$		
3	3	$\frac{7-3}{5-3}=2$	$\frac{2-1}{5-1}=\frac{1}{4}$	
5	7	$\frac{8-7}{6-5}=1$	$\frac{1-2}{6-3}=\frac{-1}{3}$	$\frac{\frac{-1}{3}-\frac{1}{4}}{6-1}=\frac{-7}{60}$
6	8			

$$f(x)=1+(x-1)+\frac{1}{4}(x-1)(x-3)-\frac{7}{60}(x-1)(x-3)(x-5)$$