4.3) NUMCOMP

$$l_i = \prod_{\substack{j=0 \\ j \neq i}}^{n} \frac{x - x_j}{x_i - x_j}$$

$x_1 = \begin{pmatrix} 0 \\ 0 \end{pmatrix}, x_2 = \begin{pmatrix} 1 \\ 2 \end{pmatrix}, x_3 = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$

$l_1 = \frac{x-1}{0-1} \frac{x-4}{0-4} = \frac{(x-1)(x-4)}{4} = x^2 - x - 4x + 4$

$l_2 = \frac{x-0}{1-0} \frac{x-4}{1-4} = \frac{x(x-4)}{-3} = \frac{x^2 - 4x}{-3}$

$l_3 = \frac{x-0}{4-0} \frac{x-1}{4-1} = \frac{x(x-1)}{12} = \frac{x^2 - x}{12}$

$$p(x) = \sum_{i}^{n} f_i l_i(x)$$

$$= 0 + 2\frac{x^2 - 4x}{-3} + 8\frac{x^2 - x}{12}$$

$$= 0 - \frac{2}{3}(x^2 - 4x) + \frac{2}{3}(x^2 - x) = -\frac{2}{3}x^2 + \frac{8}{3}x + \frac{2}{3}x^2 - \frac{2}{3}x = 2x$$

b) $p(x) = a_0 + a_1 x + a_2 x^2$

KV $\rightarrow a_0 = 0$

$a_1 = 2$

$a_2 = 0$

c) $p(2) \rightarrow 2 \cdot 2 = 4$ ✓

1.5) $f(x;0) = \sin(0) + \cos(0)(x-0) + \frac{-\sin(0)}{2}(x-0)^2$

$= 0 + x - 0$

$f(x;\frac{\pi}{2}) = \sin(\frac{\pi}{2}) + \cos(\frac{\pi}{2})(x - \frac{\pi}{2}) - \frac{\sin(\frac{\pi}{2})}{2}(x - \frac{\pi}{2})^2$

$= 1 - \frac{1}{2}(x - \frac{\pi}{2})^2$