Sec. 5.4 Lagrange Interpolation Polynomial
(supplemental)

Example:

Derive the Lagrange polynomial that interpolates the data in the following table:

$$x_0 \quad x_1 \quad x_2$$

x	-1	0	2
y	-3	2	-3

$$y_0 \quad y_1 \quad y_2$$

Solution: $L_0(x) = \dfrac{(x-0)(x-2)}{(-1-0)(-1-2)} = \dfrac{1}{3}x(x-2)$

$$L_1(x) = \dfrac{(x-(-1))(x-2)}{(0-(-1))(0-2)} = -\dfrac{1}{2}(x+1)(x-2)$$

$$L_2(x) = \dfrac{(x-(-1))(x-0)}{(2-(-1))(2-0)} = \dfrac{1}{6}(x+1)x$$

Answer: $P_2(x) = y_0 L_0(x) + y_1 L_1(x) + y_2 L_2(x)$

$$= -3 \cdot \dfrac{1}{3}x(x-2) + 2\left(-\dfrac{1}{2}\right)(x+1)(x-2)$$

$$+ (-3) \cdot \dfrac{1}{6}(x+1)x$$