1. Problem 6.1.9
Soln: Let \( k(x) = g(x) + \frac{x_0-x}{x_n-x_0}[g(x) - h(x)] \). Then we will have \( k(x) = f(x) \).

2. Problem 6.1.10
Soln: \( p(x) = \sum_{i=0}^{n} y_i \prod_{j=0, j \neq i}^{n} \frac{(x-x_j)}{(x_i-x_j)} \). Coefficient of \( x^n \) is \( \sum_{i=0}^{n} y_i \prod_{j=0, j \neq i}^{n} \frac{1}{(x_i-x_j)} \).

3. Problem 6.1.23
Soln: Newton form: \( p(x) = c_0 + c_1(x + \frac{\sqrt{3}}{5}) + c_2(x + \frac{\sqrt{3}}{5})x \) where \( c_0 = f(-\frac{\sqrt{3}}{5}), c_1 = \frac{[f(0) - f(-\frac{\sqrt{3}}{5})]/\sqrt{3/5}, c_2 = [f(\frac{\sqrt{3}}{5} - 2f(0) + f(-\frac{\sqrt{3}}{5})]/[6/5]. \)

Lagrange form: \( p(x) = f(\frac{\sqrt{3}}{5})l_0(x) + f(0)l_1(x) + f(\frac{\sqrt{3}}{5})l_2(x) \) where \( l_0(x) = (5/6)x(x - \frac{\sqrt{3}}{5}), l_1(x) = -(5/3)(x + \frac{\sqrt{3}}{5})(x - \frac{\sqrt{3}}{5}), l_2(x) = (5/6)(x + \frac{\sqrt{3}}{5})x. \)

4. Soln: \( p(x) = x + 1, p(0.3) = 1.3. e = 2^{0.3} - 1.3 \approx 0.069. \)

5. Problem 6.2.3
Proof: Since \( f^{(n)}(x) \) is continuous in a neighborhood of \( x_0 \), so \( f[x_0, ... , x_0] = (1/n!)f^{(n)}(x_0) \) by Theorem 6.2.4.

6. Problem 6.2.6
Proof: By induction. Check it is true for \( n = 1 \), trivial. Suppose it is true for \( 2, 3, ... , n \).
Consider \( (\alpha f + \beta g)[x_0, ... , x_{n+1}] = \{(\alpha f + \beta g)[x_1, ... , x_{n+1}] - (\alpha f + \beta g)[x_0, ... , x_n]\}/(x_{n+1} - x_0) = \{\alpha f[x_1, ... , x_{n+1}] - \alpha f[x_0, ... , x_n] + \beta g[x_1, ... , x_{n+1}] - \beta g[x_0, ... , x_n]\}/(x_{n+1} - x_0) = \alpha f[x_0, ... , x_{n+1}] + \beta g[x_0, ... , x_{n+1}]. \)