$\underbrace{N_{n+1}}(x) = N_n(x) + q(x)$ ← $n+1^{\text{th}}$ degree

stay out of the way of $N_n(x)$ for $x_0, \ldots, x_n$

And take care of x_{n+1}

$\left(N_{n+1}(x_{n+1}) = f(x_{n+1}) \right)$

$$q(x_i) = \begin{cases} 0 & i \in \{0, \ldots, n\} \\ f(x_i) - N_n(x_i) & i = n+1 \end{cases}$$

$$q(x) = \frac{(x-x_0)}{(x_{n+1}-x_0)} \frac{(x-x_1)}{(x_{n+1}-x_1)} \cdots \frac{(x-x_n)}{(x_{n+1}-x_n)} \cdot \left(f(x_{n+1}) - N_n(x_{n+1}) \right)$$

$$N_{n+1}(x) = a_0 + a_1(x-x_0) + a_2(x-x_0)(x-x_1) + \cdots + q_{n+1}(x)$$

a_0: $f(x_0)$

a_1: $\dfrac{f(x_1) - f(x_0)}{x_1 - x_0}$

a_2: $f(x_2) - N$

Mar 11-4:27 PM