Def: A sequence $p_n \to p$ of order α if

$$\lim_{n\to\infty} \frac{|p_{n+1}-p|}{|p_n-p|^\alpha} = \lambda > 0$$

- if $\alpha = 1$ $\quad 0 < \lambda \le 1$ - converges linearly
- if $\alpha = 2$ $\quad 0 < \lambda$ - converges quadratically

Ex: Determine whether the sequence

$$p_n = 10^{-2n}$$

converges to zero linearly or quadratically

Solution: $p_{n+1} = 10^{-2(n+1)}$

$$\lim \frac{10^{-2(n+1)}}{(10^{-2n})^\alpha} = \lim_{n\to\infty} \frac{10^{-2(n+1)}}{10^{-2n\alpha}} =$$

$$= \lim_{n\to\infty} 10^{-2n(1-\alpha)} \cdot 10^{-2} \underset{\text{if } \alpha=1}{=} 10^{-2}$$

Thus, the sequence converges linearly.

5) Lagrange Interpolation

Given: $x_0, \ldots, x_n$ $\quad (n+1)$ points

$f_0, \ldots, f_n$

we can write a polynomial of degree n