Santiago Vargas & Damian Cortina

Taller 2 - Métodos computacionales

Ej 5 Demuestre que

$$D^4 f(x_i) = \frac{f(x_{i+2}) - 4f(x_{i+1}) + 6f(x_i) - 4f(x_{i-1}) + f(x_{i-2})}{h^4}$$

$$f''(x_i) \cong \frac{f(x_{i+1}) - 2f(x_i) + f(x_{i-1})}{h^2} = g(x)$$

$$g''(x_i) = \frac{g(x_{i+1}) - 2g(x_i) + g(x_{i-1})}{h^2}$$

$$\left.\begin{aligned}
g(x_{i+1}) &= \frac{1}{h^2}\left[f(x_{i+2}) - 2f(x_{i+1}) + f(x_i)\right] \\
g(x_{i-1}) &= \frac{1}{h^2}\left[f(x_i) - 2f(x_{i-1}) + f(x_{i-2})\right] \\
g(x_i) &= \frac{1}{h^2}\left[f(x_{i+1}) - 2f(x_i) + f(x_{i-1})\right]
\end{aligned}\right\}$$

$$\frac{1}{h^2}\frac{1}{h^2}\left[f(x_{i+2}) \underbrace{- 2f(x_{i+1})}_{B} + \underbrace{f(x_i)}_{A} \underbrace{- 2f(x_{i+1})}_{B} + \underbrace{4f(x_i)}_{A} \underbrace{- 2f(x_{i-1})}_{C} + \underbrace{f(x_i)}_{A} \underbrace{- 2f(x_{i-1})}_{C} + f(x_{i-2})\right]$$

$$\frac{1}{h^4}\left[f(x_{i+2}) - 4f(x_{i+1}) + 6f(x_i) - 4f(x_{i-1}) + f(x_{i-2})\right] \quad \blacksquare$$