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Taller 2 - Métodos computacionales

Ej 1

$$\frac{d^2 f(x_i)}{dx^2} = \frac{f(x_i+2) - 2f(x_i) + f(x_i-2)}{4h^2}$$

Siendo:

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

$$f''(x_i) = [f'(x_i)]' = g'(x_i) \approx \frac{g(x_i+1) - g(x_i-1)}{2h} \quad [\text{Ec. 1}]$$

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

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

Reemplazando ① y ② en ec. 1 :

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

$$= \frac{1}{2h}\left[f(x_{i+2}) - f(x_i) - f(x_i) + f(x_{i-2})\right] \cdot \frac{1}{2h}$$

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

▨