Métodos computacionales — Taller 2

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Ej 4a

Sea $M = [-1, 0, 1]$

$$\underbrace{Df(x_n)}_{g} = \frac{1}{2h} \sum_{m=-1}^{1} M[m+1]\, f(x_{n-m})$$

$$Dg(x_n) = \frac{1}{2h} \sum_{m'=-1}^{1} M[m'+1]\, g(x_{n-m'})$$

$$= \frac{1}{2h} \sum_{m'=-1}^{1} M[m'+1] \left(\frac{1}{2h} \sum_{m=-1}^{1} M[m+1]\, f(x_{n-m'-m}) \right)$$

$$= \frac{1}{(2h)^2} \sum_{m=-1}^{1} \sum_{m'=-1}^{1} M[m'+1]\, M[m+1]\, f(x_{n-m'-m})$$

$$= \frac{1}{(2h)^2} \left(f(x_{n+2}) + f(x_{n-2}) - 2f(x_n) \right)$$

∎