

4.a

viernes, septiembre 02, 2022

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4.a) $D^2 f(x)$

$$Df(x_n) = \frac{1}{2h} \sum_{m=-\infty}^{\infty} M[m+1] f(x_n - m)$$

$$D^2 f(x_n) = \frac{1}{2h} \sum_{k=-\infty}^{\infty} M[k+1] (Df(x_n - k))$$

$$\Rightarrow D^2 f(x_n) = \frac{1}{4h^2} \sum_{k=-\infty}^{\infty} M[k+1] \left(\sum_{m=-\infty}^{\infty} M[m+1] f(x_n - k - m) \right)$$

\downarrow $-2, -1, 0$ \downarrow $-2, -1, 0$

• Estamos usando $M = [1, 0, -1]$

$$\rightarrow D^2 f(x_n) = \frac{1}{4h^2} \left(f(x_{n+4}) - \cancel{f(x_{n+2})} + \cancel{f(x_{n+2})} + f(x_n) \right)$$

$$\Rightarrow D^2 f(x_n) = \frac{1}{4h^2} (f(x_{n+4}) + f(x_n))$$