

2) Tenemos que:

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

$$\begin{aligned} f''(x_i) &\approx \frac{f'(x_{i+1}) - f'(x_{i-1}))}{2h} \\ &\approx \frac{\left(\frac{f(x_{i+1+1}) - f(x_{i+1-1}))}{2h} \right) - \left(\frac{f(x_{i-1+1}) - f(x_{i-1-1}))}{2h} \right)}{2h} \\ &\approx \frac{\left(\frac{f(x_{i+2}) - 2f(x_i) + f(x_{i-2}))}{2h} \right)}{2h} \end{aligned}$$

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

3) 1. Si para $f'(x) = \frac{f(x+h) - f(x-h)}{h^2}$ tenemos la máscara de convolución $[1, 0, -1]$ entonces para $D^2(x)$ tendremos $[1, 2, 1]$ haciendo

$$D^2 f(x_n) = \frac{1}{h^2} \sum M[m+1] f(x_{n-m})$$