

Diferenciación numérica

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Resumen de fórmulas

Diferencias Hacia Adelante

$$\begin{aligned}f'(x_i) &\approx \frac{f(x_{i+1}) - f(x_i)}{h} \\f''(x_i) &\approx \frac{f(x_{i+2}) - 2f(x_{i+1}) + f(x_i)}{h^2} \\f'''(x_i) &\approx \frac{f(x_{i+3}) - 3f(x_{i+2}) + 3f(x_{i+1}) - f(x_i)}{2h^3} \\f^{iv}(x_i) &\approx \frac{f(x_{i+4}) - 4f(x_{i+3}) + 6f(x_{i+2}) - 4f(x_{i+1}) + f(x_i)}{h^4}\end{aligned}$$

Diferencias Hacia Atrás

$$\begin{aligned}f'(x_i) &\approx \frac{f(x_i) - f(x_{i-1})}{h} \\f''(x_i) &\approx \frac{f(x_i) - 2f(x_{i-1}) + f(x_{i-2})}{h^2} \\f'''(x_i) &\approx \frac{f(x_i) - 3f(x_{i-1}) + 3f(x_{i-2}) - f(x_{i-3})}{2h^3} \\f^{iv}(x_i) &\approx \frac{f(x_i) - 4f(x_{i-1}) + 6f(x_{i-2}) - 4f(x_{i-3}) + f(x_{i-4})}{h^4}\end{aligned}$$

Diferencias Centrales

$$\begin{aligned}f'(x_i) &\approx \frac{f(x_{i+1}) - f(x_{i-1}))}{2h} \\f''(x_i) &\approx \frac{f(x_{i+1}) - 2f(x_i) + f(x_{i-1}))}{h^2} \\f'''(x_i) &\approx \frac{f(x_{i+2}) - 2f(x_{i+1}) + 2f(x_{i-1}) - f(x_{i-2}))}{2h^3} \\f^{iv}(x_i) &\approx \frac{f(x_{i+2}) - 4f(x_{i+1}) + 6f(x_i) - 4f(x_{i-1}) + f(x_{i-2}))}{h^4}\end{aligned}$$