Taller 10 - Daniel Amado.

1. $x_i = 1,2$ $\qquad f(x) = 0,65x^3 + 0,5x + 1.$

$h = 0,1$ $\qquad f'(x) = 1,95x^2 + 0,5$

$f''(x) = 3,9x$

Primera hacia adelante

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

$$f'(1,2) = \frac{f(1,3) - f(1,2)}{0,1}$$

$$f'(1,2) = \frac{3,07805 - 2,7232}{0,1} \longrightarrow f'(1,2) = 3,5485.$$

Primera hacia atrás.

$$f'(x_1) = \frac{f(x_i) - f(x_{i-1})}{h} + O(h)$$

$$f'(x_1) = \frac{f(1,2) - f(1,1)}{0,1}$$

$$f'(1,2) = \frac{2,7232 - 2,41515}{0,1} \longrightarrow f'(1,2) = 3,0805$$

Primera Centrada

$$f'(x_1) = \frac{f(x_{1+1}) - f(x_{1-1})}{2h} + O(h^2)$$

$$f'(1,2) = \frac{3,07805 - 2,41515}{2(0,1)} \longrightarrow f'(1,2) = 3,3145$$

Segunda hacia adelante

$$f''(x_1) = \frac{f(x_{i+2}) - 2f(x_{1+1}) + f(x_i)}{h^2} + O(h)$$

$$f''(x_1) = \frac{f(1,4) - 2f(1,3) + f(1,2)}{0,1^2}$$

$$f''(x_1) = \frac{3,4836 - 2(3,07805) + 2,7232}{0,1^2} \longrightarrow f''(1,2) = 5,07$$

Segunda hacia atrás

$$f''(x_1) = \frac{f(x_i) - 2f(x_{i-1}) + f(x_{i-2})}{(0{,}1)^2} + O(h)$$

$$f''(x_1) = \frac{f(1{,}2) - 2f(1{,}1) + f(1)}{(0{,}1)^2}$$

$$f''(x_1) = \frac{2{,}7232 - 2(2{,}41515) + 2{,}15}{(0{,}1)^2} \longrightarrow f''(1{,}2) = 4{,}29$$

Segunda Centrada

$$f''(x_1) = \frac{f(x_{i+1}) - 2f(x_i) + f(x_{i-1})}{h^2} + O(h^2)$$

$$f''(x_1) = \frac{f(1{,}3) - 2f(1{,}2) + f(1{,}1)}{0{,}1^2}$$

$$f''(x_1) = \frac{3{,}07805 - 2(2{,}7232) + 2{,}41515}{0{,}1^2} \longrightarrow f''(1{,}2) = 4{,}68$$

Valor verdadero primera → $f'(x) = 1{,}95x^2 + 0{,}5$

$f'(x) = 1{,}95(1{,}2)^2 + 0{,}5$

$f'(x) = 3{,}308$

Valor verdadero segunda → $f''(x) = 3{,}9x$

$f''(x) = 3{,}9(1{,}2)$

$f''(x) = 4{,}68$

2. $x = 1{,}2$

$h = 0{,}05$

$f(x) = 0{,}65x^3 + 0{,}5x + 1.$

$f'(x) = 1{,}95x^2 + 0{,}5$

$f''(x) = 3{,}9x$

Son mejores estos resultados. únicamente porque la primera se acerca mucho más a la real que en el punto 1.

Primera centrada

$$f'(x_1) = \frac{f(x_{i+1}) - f(x_{i-1})}{2h} + O(h^2)$$

$$f'(x_1) = \frac{f(1{,}25) - f(1{,}15)}{2(0{,}05)}$$

$$f'(x_1) = \frac{2{,}89453125 - 2{,}56356875}{2(0{,}05)} \longrightarrow f'(1{,}2) = 3{,}309625$$

Segunda centrada

$$f''(x_1) = \frac{f(x_{i+1}) - 2f(x_i) + f(x_{i-1})}{h^2} + O(h^2)$$

$$f''(x_1) = \frac{f(1{,}25) - 2f(1{,}2) + f(1{,}15)}{0{,}05^2}$$

$$f''(x_1) = \frac{2{,}89453125 - 2(2{,}7232) + 2{,}56356875}{0{,}05^2} \longrightarrow f''(1{,}2) = 4{,}68$$