

Solution 4.8

True value:

$$f''(x) = 150x - 12$$

$$f''(2) = 150(2) - 12 = 288$$

$h = 0.25$:

$$f''(2) = \frac{f(2.25) - 2f(2) + f(1.75)}{0.25^2} = \frac{182.1406 - 2(102) + 39.85938}{0.25^2} = 288$$

$h = 0.125$:

$$f''(2) = \frac{f(2.125) - 2f(2) + f(1.875)}{0.125^2} = \frac{139.6738 - 2(102) + 68.82617}{0.125^2} = 288$$

Both results are exact because the errors are a function of 4^{th} and higher derivatives which are zero for a 3^{rd} -order polynomial.