Answer on Question #75525 – Math – Quantitative Methods

Question

The position f(x) of a particle moving in a line at various times xk is given in the following table. Estimate the velocity and acceleration of the particle at x=1.2

x	f(x)
1.0	2.72
1.2	3.32
1.4	4.06
1.6	4.96
1.8	6.05
2.0	7.39
2.2	9.02

Solution

$$v(x) = f'(x) \approx \frac{f(x+h)-f(x-h)}{2h}.$$

$$v(1.2) = f'(1.2) \approx \frac{f(1.4)-f(1.0)}{2*02} = \frac{4.06-2.72}{0.4} = 3.35.$$

$$a(x) = f''(x) \approx \frac{f(x+h)-2f(x)+f(x-h)}{h^2}.$$

$$a(1.2) = f''(1.2) \approx \frac{f(1.4)-2f(1.2)+f(1.0)}{0.2^2} = \frac{4.06-2*3.32+2.72}{0.04} = 3.5.$$