Taller 10

Primer Problema

Dada la función:

$$f(x) = 0.3x^3 - 1.8x^2 + 2.5x - 1$$

Derivadas de f(x)

$$f'(x) = 0.9x^2 - 3.6x + 2.5$$

$$f''(x) = 1.8x - 3.6$$

$$f'''(x) = 1.8$$

Evaluamos en x=0.4

$$f(0.4) = 0.3(0.4)^3 - 1.8(0.4)^2 + 2.5(0.4) - 1$$

$$= 0.3(0.064) - 1.8(0.16) + 1 - 1$$

$$= 0.0192 - 0.288 + 1 - 1 = -0.2688$$

$$f'(0.4) = 0.9(0.4)2 - 3.6(0.4) + 2.5$$

$$= 0.9(0.16) - 3.6(0.4) + 2.5$$

$$= 0.144 - 1.44 + 2.5 = 1.204$$

$$f''(0.4) = 1.8(0.4) - 3.6 = 0.72 - 3.6 = -2.88$$

$$f'''(0.4) = 1.8$$

Expansión de Taylor hasta el tercer orden

Usamos x=0.5, a=0.4 y =0.5-0.4=0.1:

$$f(0.5) \approx f(0.4) + f'(0.4)h + \frac{f''(0.4)}{2}h^2 + \frac{f'''(0.4)}{6}h^3$$

$$f(0.5) \approx -0.2688 + (1.204)(0.1) + -\frac{2.88}{2}(0.1)^2 + \frac{1.8}{6}(0.1)^3$$

$$= -0.2688 + 0.1204 - 0.0144 + 0.0003$$

Respuesta: f(0.5)≈−0.1625f

Segundo Problema

Dada la función:

$$f(x) = 1.4e^x - 3.2x + 2.4$$

Derivadas de f(x)

$$f'(x) = 1.4e^x - 3.2$$

$$f''(x) = 1.4e^x$$

$$f'''(x) = 1.4e^x$$

Evaluamos en x=0.6

$$f(0.6) = 1.4e^{0.6} - 3.2(0.6) + 2.4$$

$$\approx 1.4(1.8221) - 1.92 + 2.4$$

$$\approx 2.5509 - 1.92 + 2.4 = 3.0309$$

$$f'(0.6) = 1.4e^{0.6} - 3.2$$

$$\approx 2.5509 - 3.2 = -0.6491$$

$$f''(0.6) = 1.4e^{0.6} \approx 2.5509$$

$$f'''(0.6) = 1.4e^{0.6} \approx 2.5509$$

Expansión de Taylor hasta el tercer orden

Usamos x=0.65 a=0.6 y h=0.05

$$f(0.65) \approx f(0.6) + f'(0.6)h + \frac{f''(0.6)}{2}h^2 + \frac{f'''(0.6)}{6}h^3$$

$$f(0.65) \approx 3.0309 + (-0.6491)(0.05) + \frac{2.5509}{2}(0.05)^2 + \frac{2.5509}{6}(0.05)^3$$

$$= 3.0309 - 0.032455 + 0.03188625 + 0.0001062875$$

Respuesta: f(0.65)≈3.0304