DERIVACIÓN

5

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

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

$$f^{(4)}(x) = \frac{\frac{f(x+2h) - 2f(x+h) + f(x) - 2(f(x+h) - 2f(x) + f(x-h))}{h^2} + \frac{f(x) - 2f(x-h) + f(x-2h)}{h^2}}{h^2}$$

$$f^{4}(x) = \frac{\frac{f(x+2h) + f(x-2h) - 2f(x+h) + f(x) - 2f(x+h) + 4f(x) - 2f(x-h) + f(x) - 2f(x-h)}{h^2}}{h^2}$$

$$f^{(4)}(x) = \frac{f(x+2h) - 4f(x+h) + 6f(x) - 4f(x-h) + f(x-2h)}{h^4}$$

Derivación

8) a) $\Omega = \{(x_0, f(x_0)), (x_1, f(x_1)), (x_2, f(x_2))\}$

$$p(x) = a_0 + a_1(x - x_0) + a_2(x - x_1)(x - x_0)$$

$$a_0 = f_0$$

$$a_1 = \frac{f_1 - f_0}{h} \qquad h = x_1 - x_0$$

$$a_2 = \frac{f_2 - 2f_1 + f_0}{2h^2}$$

$$P(x) = f_0 + \frac{f_1 - f_0}{h}(x - x_0) + \frac{f_2 - 2f_1 + f_0}{2h^2}\left(x^2 - x(x_1 - x_0) + (x_0)(x_1)\right)$$

b)

$$P'(x) = \frac{f_1 - f_0}{h} + \cancel{2}\left(\frac{f_2 - 2f_1 + f_0}{\cancel{2}h^2}\right)x - \left(\frac{f_2 - 2f_1 + f_0}{2h^2}\right)(x_1 - x_0)$$

$$P'(x) = \frac{f_1 - f_0}{h} + \frac{f_2 - 2f_1 + f_0}{h^2}x - \left(\frac{f_2 - 2f_1 + f_0}{2h^{\cancel{2}}}\right)\cancel{h}$$

$$P'(x) = \frac{f_1 - f_0}{h} - \frac{f_2 + 2f_1 - f_0}{2h} + \frac{f_2 - 2f_1 + f_0}{h^2}x$$

$$P'(x) = \frac{2f_1 - 2f_0 - f_2 + 2f_1 - f_0}{2h} + \frac{f_2 - 2f_1 + f_0}{h^2}x$$

$$P'(x_0) = \frac{1}{2h}\left(-3f(x_0) + 4f(x_1) - f(x_2)\right) + \left(\frac{f_2 - 2f_1 + f_0}{h^2}\right)x_0$$

$$P'(x_0) = \frac{1}{2h}\left(-3f(x_0) + 4f(x_1) - f(x_2)\right) + \frac{h^2}{\left(f(x_2) - 2f(x_1) + f(x_0)\right)x_0} \rightarrow O(h^2)$$

$$P'(x) = \frac{1}{2h}\left(-3f(x_0) + 4f(x_1) - f(x_2)\right)$$

$y = \cancel{y_0} + V_{oy} t - \frac{1}{2} g t^2$ $V_{ox} = V_o \cos\theta$

$x = \cancel{x_0} + \overset{0}{V_{ox}} t$ $V_{oy} = V_o \operatorname{Sen}\theta$

$y = V_o \operatorname{Sen}\theta \, t - \frac{1}{2} g t^2$

$x = V_o \cos\theta \, t$

$\frac{x}{V_o \cos\theta} = t$

$y = V_o \operatorname{Sen}\theta \left(\frac{x}{V_o \cos\theta} \right) - \frac{1}{2} g \left(\frac{x^2}{V_o^2 \cos^2\theta} \right)$

$y = \operatorname{Tan}\theta \, x - \frac{1}{2} \frac{g}{V_o^2 \cos^2\theta} x^2$

$y = a x^2 + b x + c$

$a = \operatorname{Tan}\theta$

$b = -\frac{1}{2} \frac{g}{V_o^2 \cos^2\theta}$

$\theta = \operatorname{ArcTan}(a)$

$V_o = \sqrt{\frac{-g}{2 \cos^2\theta \, b}}$