Nota 5,0

1

I. $\frac{dy}{dx} = \frac{-(3x^2+2xy)}{(x^2+\cos y)} = \frac{-3x^2-2xy}{x^2+\cos y}$

2

a) $\frac{dA(t)}{dt} = \left(\frac{1g}{L}\right)\left(\frac{4L}{min}\right) - \left(\frac{A(t)}{200+(1-2)t}\right)\left(\frac{2L}{min}\right)$

$\boxed{\frac{dA(t)}{dt} = 4 - \frac{A(t)}{100+t}} \Rightarrow A'(t)(100+t) = 400 + 4t - A(t)$

b)

$A(t) = C_1(t+100) + 4(t+100)\ln(t+100) \Rightarrow C_1 = -18,38224419$

$A(5) = 24,5277$

3

$\frac{dv}{dt} = 1,2 - \frac{v(t)}{4} \Rightarrow \frac{dv}{dt} + \frac{1}{4}v(t) = 1,2 \Rightarrow v'(t) + \frac{1}{4}v(t) = 1,2$

$v = 4,8 + C e^{-t/4}$ $\qquad v(0) = 0,2\%\ 8000\,ft^3 = \frac{0,2}{100}\,8000 = 16\,ft^3$

$v(0) = 16$

$16 = 4,8 + C \Rightarrow C = 11,2$

$v(t) = 4,8 + 11,2\,e^{-t/4}$ $\qquad v(2) = 11,59$

6 $f''(x) = -\dfrac{5x}{2x^2-1}$

$f'''(x) = \dfrac{5(2x^2-1)}{(2x^2+1)^2} \Rightarrow f'''(x)=0 \quad \dfrac{5(2x^2-1)}{(2x^2+1)^2} = 0$

$2x^2-1=0$

$x = |\sqrt{1/2}| = 0{,}70710$

$10^{-2} \leq \left|\dfrac{12{,}125}{12n^2}\right| \Rightarrow n^2 \leq \dfrac{12{,}125}{12 \times 10^{-2}} \Rightarrow n \leq 10{,}052$

$n = 11$

$\Delta x = \dfrac{b-a}{h} \approx 0{,}1727 \qquad f''(\sqrt{1/2}) = |-1{,}7678| \Rightarrow K = 1{,}7678$

$\int f'(x) = -\frac{5}{4}\left(x\ln(2x^2+1) - \sqrt{2}\left(-\tan^{-1}(\sqrt{2}x) + \sqrt{2}x\right)\right) + C$

7 $n = 6(4) = 24$

$f(x) = e^{\operatorname{sen}(x)} \qquad f'(x) = -\cos x\, e^{\operatorname{sen}(x)}$

$g(x) = \sqrt{1+y'} = \sqrt{1-\cos(x)\, e^{\operatorname{sen}(x)}}$

8

a) $f'''(x_0) = \dfrac{f(x_0-3h) - 8f(x_0-2h) + 13f(x_0-h) - 13f(x_0+h) + 8f(x_0+2h) - f(x_0+3h}{8h^3}$

Excel

b) $f''(x) = \dfrac{-3x\cos(\sqrt{x}) + x\sqrt{x}\operatorname{sen}(\sqrt{x}) - 60\sqrt{x}\operatorname{sen}\sqrt{x} - 60\cos\sqrt{x}}{4x\sqrt{x}} + 2$

$f''(12{,}4251787380887) = 0{,}873 \Rightarrow K = 0{,}873$

Excel

9 $f'''(t) = -4(2t\ln(t) + t) = 0$

$t = 0 \quad 2\ln(t) + 1 \Rightarrow t = 1/\sqrt{e}$

$f''(t) = -4t^2\ln(t) + 1 \Rightarrow f''(t) = 1{,}7358 \Rightarrow k = 1{,}7358$

$\varepsilon_T = 2\times10^{-4} \Rightarrow n^2 \leq \left|\dfrac{(b-a)^3 k}{12\varepsilon_T}\right| \Rightarrow n \leq 19{,}24 \Rightarrow n = 20$