Universidade de Aveiro
Departamento de Matemática

Cálculo II - Agrupamento 4 **2014/15**

Folha 2 - parte 2: *Soluções*

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1. (a) $y = \dfrac{x^4}{2} + K\,x^2\,, \qquad K \in \mathbb{R};$

   (b) $y = \dfrac{x}{2}\,\mathrm{cosec}\,x - \dfrac{\cos x}{2} + K\,\mathrm{cosec}\,x\,, \qquad K \in \mathbb{R}.$

2. (a) $y = C_1\,\mathrm{e}^{-x} + \dfrac{\mathrm{sen}\,x}{2} - \dfrac{\cos x}{2};$

   (b) $y = C_1\,\mathrm{e}^{x} + C_2\,\mathrm{e}^{-x} + \cos x;$

   (c) $y = C_1\,\mathrm{e}^{x} + C_2\,\mathrm{e}^{-2x} + 3x;$

   (d) $y = \left(C_1 + C_2 x + \dfrac{x^3}{6}\right)\mathrm{e}^{2x};$

   (e) $y = C_1 + (C_2 - x)\,\mathrm{e}^{-x};$

   (f) $y = C_1\,\mathrm{sen}\,(2x) + C_2\,\cos(2x) - \dfrac{1}{4}\cos(2x)\,\ln|\sec(2x) + \tan(2x)|$; também se pode escrever na forma $y = C_1\,\mathrm{sen}\,(2x) + C_2\,\cos(2x) - \dfrac{1}{4}\cos(2x)\,\ln\left|\dfrac{1+\tan x}{1-\tan x}\right|;$

   (g) $y = C_1 + C_2\,\cos x + C_3\,\mathrm{sen}\,x - \dfrac{x}{2}\,\mathrm{sen}\,x;$

   (h) $y = C_1\,\mathrm{sen}\,(3x) + C_2\,\cos(3x) + \dfrac{\mathrm{sen}\,x}{8} - \dfrac{\mathrm{e}^{-x}}{10}.$

   (C_1, C_2, C_3 são constantes reais arbitrárias).

3. $y = \dfrac{3}{4}(x-\pi)\,\mathrm{e}^{2(\pi - x)} + \dfrac{\mathrm{sen}\,(2x)}{8}.$

4. (a) $x(t) = \dfrac{3}{10}\,\mathrm{sen}\,t - \dfrac{1}{10}\,\cos t - \dfrac{9}{10}\,\mathrm{e}^{\frac{t}{3}};$

   (b) $y(t) = \dfrac{1}{3}\,\mathrm{sen}\,(6t) - \cos(6t);$

   (c) $y(t) = t - \dfrac{2}{3} + \dfrac{2}{3\sqrt{2}}\,\mathrm{e}^{-t}\mathrm{sen}\,(\sqrt{2}\,t) + \dfrac{2}{3}\,\mathrm{e}^{-t}\cos(\sqrt{2}\,t);$

   (d) $y(t) = (t-\pi)^2 + 2\pi(t-\pi) + \pi^2 - 1 + \cos(t-\pi) = t^2 - 1 - \cos t.$

5. (a) $y = \dfrac{K}{(x^2+1)^2}\,, \qquad K \in \mathbb{R};$

   (b) $y = C_1\,\cos x + C_2\,\mathrm{sen}\,x + x\,\cos x\,, \qquad C_1, C_2 \in \mathbb{R}.$

6. $y = 1 + \mathrm{e}^{-\mathrm{sen}\,x}\,, \quad x \in \mathbb{R}.$

7. (a) $y = C\,\mathrm{e}^{\mathrm{arctg}\,x}\,, \qquad C \in \mathbb{R};$

   (b) $y = C_1 + C_2\,\cos(2x) + C_3\,\mathrm{sen}\,(2x) + \dfrac{1}{3}\,\mathrm{sen}\,x\,, \qquad C_1, C_2 \in \mathbb{R}.$

8. $y = K\,\mathrm{e}^{x^3} - \dfrac{1}{3}\,, \qquad K \in \mathbb{R}.$

9. $y = C_1\,\mathrm{e}^{-2x} + (C_2 + C_3 x + 2x^2)\,\mathrm{e}^{x}\,, \qquad C_1, C_2, C_3 \in \mathbb{R}.$