UNIVERSIDADE FEDERAL DE VIÇOSA - UFV
Departamento de Matemática - DMA/CCE
2^a Lista de exercícios de MAT 147 - Cálculo II

GABARITO - 2019/2

1. (a) $I_c = \left(-\frac{1}{3}, \frac{1}{3},\right)$, $R_c = \frac{1}{3}$
   (b) $I_c = \left(-\frac{1}{3}, \frac{1}{3},\right)$, $R_c = \frac{1}{3}$
   (c) $I_c = (-1, 1)$, $R_c = 1$
   (d) $I_c = (-4, 6)$, $R_c = 5$
   (e) $I_c = (1, 3]$, $R_c = 1$
   (f) $I_c = (-\infty, +\infty)$, $R_c = +\infty$
   (g) $I_c = \{0\}$, $R_c = 0$
   (h) $I_c = (1, 3)$, $R_c = 1$
   (i) $I_c = [-1, 1]$, $R_c = 1$
   (j) $I_c = [-2, 2)$, $R_c = 2$
   (k) $I_c = [-1, 1]$, $R_c = 1$
   (l) $I_c = [-1, 1]$, $R_c = 1$
   (m) $I_c = (-\infty, +\infty)$, $R_c = +\infty$
   (n) $I_c = (-5, -1)$, $R_c = 2$
   (o) $I_c = (-9, 9]$, $R_c = 9$
   (p) $I_c = (-\infty, +\infty)$, $R_c = +\infty$
   (q) $I_c = (0, 2]$, $R_c = 1$
   (r) $I_c = [-4, 0)$, $R_c = 2$
   (s) $I_c = [-1, 1)$, $R_c = 1$
   (t) $I_c = [-6, -4]$, $R_c = 1$
   (u) $I_c = \left(-\frac{1}{2}, \frac{1}{2},\right)$, $R_c = \frac{1}{2}$
   (v) $I_c = \{3\}$, $R_c = 0$
   (w) $I_c = \left(-\frac{19}{3}, -\frac{11}{3},\right)$, $R_c = \frac{4}{3}$
   (x) $I_c = \{2\}$, $R_c = 0$
   (y) $I_c = (-\infty, +\infty)$, $R_c = +\infty$

2. VFVVVVV

3. (a) $D(f) = (1, 3)$
   (b) 2
   (c) $f'(x) = \displaystyle\sum_{n=1}^{+\infty} n(-1)^n (x-2)^{n-1}$
   (d) $D(f') = (1, 3)$

4. (a) $D(f) = [-1, 1]$
   (b) $D(f') = [-1, 1)$

5. $g(x) = \displaystyle\sum_{n=1}^{+\infty} n x^{n-1}$

6. (a) $\displaystyle\sum_{n=0}^{+\infty} (-1)^n x^{2n}$, $R_c = 1$
   (b) $\arctan x$

7. (a) $e^{-x} = \displaystyle\sum_{n=0}^{+\infty} (-1)^n \frac{x^n}{n!}$
   (b) $\ln(1+x) = \displaystyle\sum_{n=1}^{+\infty} (-1)^{n-1} \frac{x^n}{n}$
   (c) $\arctan x = \displaystyle\sum_{n=0}^{+\infty} (-1)^n \frac{x^{2n+1}}{2n+1}$

8. (a) $\displaystyle\sum_{n=0}^{+\infty} (-1)^n (x-1)^n$
   (b) $1 + \dfrac{1}{2}x + \displaystyle\sum_{n=2}^{+\infty} \frac{(-1)^{n+1} 1.3.5...(2n-3) x^n}{2^n n!}$
   (c) $\displaystyle\sum_{n=1}^{+\infty} (-1)^{n-1} \frac{(x-1)^n}{n}$
   (d) $2 + \dfrac{1}{4}x + 2\displaystyle\sum_{n=2}^{+\infty} \frac{(-1)^{n-1} 1.3.5...(2n-3)(x-4)^n}{2.4.6...(2n)4^n}$
   (e) $\displaystyle\sum_{n=1}^{+\infty} (-1)^{n+1} \frac{x^{2n-1}}{(2n)!}$
   (f) $\dfrac{1}{2}\displaystyle\sum_{n=1}^{+\infty} (-1)^{n-1} \frac{(2x)^{2n}}{(2n)!}$

(g) $\sum_{n=0}^{+\infty} \frac{(\ln 2)^n}{n!} x^n$

(h) $63-111(x+1)+89(x+1)^2-31(x+1)^3+4(x+1)^4$

9. (a) $\sum_{n=0}^{+\infty}(-1)^n \frac{x^{2n+1}}{n!(2n+1)}$

   (b) $\sum_{n=0}^{+\infty} \frac{x^{n+1}}{(n+1)!}$

   (c) $\sum_{n=1}^{+\infty} \frac{(-1)^{n+1}x^{2n-1}}{(2n-1)(2n)!}$

   (d) $\sum_{n=0}^{+\infty} \frac{x^{n+1}-2^{n+1}}{4^{n+1}(n+1)}$

   (e) $\sum_{n=0}^{+\infty} \frac{(-1)^n x^{2n+1}}{4^{n+1}(2n+1)}$

   (f) $\sum_{n=1}^{+\infty} \frac{(-1)^{n-1}x^{n+1}}{n(n+1)}$

10. Multiplique a série de e^x por x.

11. Substitua x por x^3 na série da função $\frac{1}{1-x}$ e derive.

12.

13.

14. (a) $y = ct^2 + t$

    (b) $y = ct + e^t$

    (c) $y = c\text{sen}t + e^t$

    (d) $y = \text{sen}t + ct$

    (e) $y = ce^{-3t} + \frac{t}{3} - \frac{1}{9} + e^{-2t}$

    (f) $y = ce^{2t} + \frac{t^3 e^{2t}}{3}$

    (g) $y = \frac{c - t\cos t + \text{sen}\, t}{t^2}$

    (h) $y = t^2 e^{-t^2} + ce^{-t^2}$

    (i) $y = ce^{-t/2} + 3t^2 - 12t + 24$

15. (a) $y = 3e^t + 2(t-1)e^{2t}$

    (b) $y = \frac{(t^2-1)e^{-2t}}{2}$

    (c) $y = (t+2)e^{2t}$

    (d) $y = \frac{3t^4 - 4t^3 + 6t^2 + 1}{12t^2}$

    (e) $y = \frac{(\pi^2/4) - 1 - t\cos t + \text{sen}t}{t^2}$

16. (a) $3y^2 - 2t^3 = c$

    (b) $3y^2 - 2\ln|1+x^3| = c$

    (c) $y^{-1} + \cos x = c$

    (d) $3y + y^2 - x^3 + x = c$

    (e) $2\tan 2y - 2x - \text{sen}2x = c$

    (f) $y = \text{sen}[\ln|x| + c]$

    (g) $y^2 - x^2 + 2(e^y - e^{-x}) = c$

    (h) $3y + y^3 - x^3 = c$

    (i) $\tan y = c(1-e^x)^3$

17. (a) $y = [2(1-x)e^x - 1]^{1/2}$

    (b) $y = -[2\ln(1+x^2) + 4]^{1/2}$

    (c) $y = [3 - 2\sqrt{1+x^2}]^{-1/2}$

    (d) $y = -\frac{1}{2} + \frac{1}{2}\sqrt{4x^2 - 15}$

    (e) $y = -\sqrt{(x^2+1)/2}$

    (f) $y = -\frac{3}{4} + \frac{1}{4}\sqrt{65 - 8e^x - 8e^{-x}}$

    (g) $y = \frac{\pi - \text{arcsen}(3\cos^2 x)}{3}$

    (h) $1 + y^2 = \frac{2}{1-x^2}$

    (i) $r = \frac{2}{1 - 2\ln\theta}$

18. (a) $ct^2y^2 + ty^2 - 1 = 0$

    (b) $ct^2y^2 + 2ty^2 - 1 = 0$

    (c) $y^2 = (2t+c)\cos^2 t$

    (d) $x = cy^2$

    (e) $x^2 = \frac{1}{y + cy^2}$

    (f) $y^2 = \left(\frac{5t}{2 + 5ct^5}\right)$

    (g) $y^{1/2} = c(x-2)^{-1/2} + (x-2)^2$

    (h) $x^{-3}y^{-3} + x^2 = c$

19. (a) $y = c_1e^t + c_2te^t$
(b) $y = c_1e^{-t} + c_2e^{-2t}$
(c) $y = c_1e^{-t/2} + c_2e^{3t/2}$
(d) $y = c_1e^{t/2} + c_2e^t$
(e) $y = c_1e^{-t}\cos t + c_2e^{-t}\text{sen}t$
(f) $y = c_1e^t\cos\sqrt{5}t + c_2e^t\text{sen}\sqrt{5}t$
(g) $y = c_1e^{-3t/4} + c_2te^{-3t/4}$
(h) $y = c_1e^t\cos t + c_2e^t\text{sen}t$
(i) $y = c_1e^{-3t/2} + c_2e^{3t/2}$
(j) $y = c_1e^t\cos 3t + c_2e^t\text{sen}3t$
(k) $y = c_1 + c_2e^{-5t}$
(l) $y = c_1e^{-3t}\cos 2t + c_2e^{-3t}\text{sen}2t$
(m) $y = c_1e^{(1+\sqrt{3})t} + c_2e^{(1-\sqrt{3})t}$
(n) $y = c_1\cos(\frac{3t}{2}) + c_2\text{sen}(\frac{3t}{2})$
(o) $y = c_1e^{-t/2}\cos(\frac{t}{2}) + c_2e^{-t/2}\text{sen}(\frac{t}{2})$

20. (a) $y = e^t$
(b) $y = \dfrac{1}{2}\text{sen}2t$
(c) $y = 2te^{3t}$
(d) $y = -1 - e^{-3t}$
(e) $y = -e^{(t-\frac{\pi}{2})}\text{sen}2t$
(f) $y = -e^{-t/3}\cos 3t + \frac{5}{9}e^{-t/3}\text{sen}3t$
(g) $y = \frac{1}{10}e^{-9(t-1)} + \frac{9}{10}e^{t-1}$
(h) $y = (1+2\sqrt{3})\cos t - (2-\sqrt{3})\text{sen}t$
(i) $y = 7e^{-2(t+1)} + 5te^{-2(t+1)}$