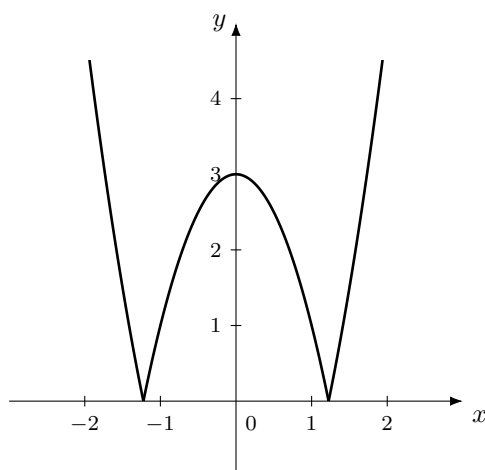


Gabarito da 1ª Lista de MAT 140 - Cálculo I 2019/II
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1. (a) $S = \{-4, 4\}$ (c) $S = \{-3, -2, 2, 3\}$ (e) $S = \{-2, -1, 1, 2\}$
(b) $S = \{8\}$ (d) $S = \emptyset$ (f) $S = \{1, 2, 3\}$

2. (a) $S = \{x \in \mathbb{R} / x < 9\}$
(b) $S = \left\{x \in \mathbb{R} / x \leq -1 \text{ ou } x \geq \frac{3}{2}\right\}$
(c) $S = \{x \in \mathbb{R} / -2 \leq x \leq 2 \text{ ou } x \geq 4\}$
(d) $S = \left\{x \in \mathbb{R} / -1 < x \leq \frac{2}{11}\right\}$
(e) $S = \{x \in \mathbb{R} / -9 \leq x < 0\}$
(f) $S = \{x \in \mathbb{R} / -1 < x < 2 \text{ ou } 3 < x < 6\}$
(g) $S = \{x \in \mathbb{R} / -3 < x < 1\}$
(h) $S = \left\{x \in \mathbb{R} / \frac{-5 - \sqrt{10}}{2} < x < -2 \text{ ou } -1 < x < \frac{-5 + \sqrt{10}}{2}\right\}$
(i) $S = \left\{x \in \mathbb{R} / x < -\frac{1}{2} \text{ ou } \frac{1 - \sqrt{7}}{6} < x < \frac{1 + \sqrt{7}}{6} \text{ ou } x > 1\right\}$
(j) $S = \{x \in \mathbb{R} / -3 < x < 3\}$
(k) $S = \{x \in \mathbb{R} / x < -1 \text{ ou } x > 2\}$
(l) $S = \{x \in \mathbb{R} / x < -5 \text{ ou } 1 < x < 5\}$

3. (a) $f(-5) = 47$
(b) $f(0) = -3$
(c) $f(\sqrt{3}) = 3$
(d) $f(x_0) = 2x_0^2 - 3$
(e) $x = \pm 1$
(f) $\frac{f(1+h) - f(1)}{h} = 4 + 2h$
(g) O gráfico de $g(x) = |f(x)|$ é:



4.

- (b) $\frac{x}{x+1}, x \neq -1, x \neq 2$
- (c) $10 + x, x \neq 0$
- (d) $\frac{x^2 + 2x + 4}{(x+2)(x^2+4)}, x \neq 2$
- (e) $\frac{x}{x+3}, x \neq -3, x \neq 3$
- (f) $\frac{2x-3}{x}, x \neq -7, x \neq 0, x \neq 2$
- (g) $x-2, x \neq -1, x \neq 2$
5. (a) $2x_0 + h + 1$
- (b) 3
- (c) $3x_0^2 + 3x_0h + h^2$
- (d) $\frac{1}{\sqrt{x_0+h+2}\sqrt{x_0+2}}$
- (e) $-\frac{1}{x_0(x_0+h)}$
6. (a) $D_f = \{x \in \mathbb{R} / x \leq -1 \text{ ou } x \geq 1\}$
- (b) $D_g = \{x \in \mathbb{R} / 0 \leq x \leq 2\}$
- (c) $D_{f+g} = D_{f-g} = D_f \cap D_g = \{x \in \mathbb{R} / 1 \leq x \leq 2\}$
- (d) $D_{f \cdot g} = D_f \cap D_g = \{x \in \mathbb{R} / 0 \leq x \leq 2\}$ e $(f \cdot g)(x) = \sqrt{(x^2-1)(2x-x^2)}$
- (e) $D_{\frac{f}{g}} = D_f \cap D_g \cap \{x \in \mathbb{R} / g(x) \neq 0\} = \{x \in \mathbb{R} / 0 \leq x < 2\}$ e $(\frac{f}{g})(x) = \sqrt{\frac{x^2-1}{2x-x^2}}$
7. (a) $A = 2$ e $B = 3$
- (b) $A = 1, B = -1$ e $C = 2$
- (c) $A = 5$ e $B = 2$
- (d) $A = 1, B = 0$ e $C = -1$
8. (a) $(g \circ f)(x) = g(f(x)) = 9x + 2, D(g \circ f) = \mathbb{R}$ e $(f \circ g)(x) = f(g(x)) = 9x + 6, D(f \circ g) = \mathbb{R}$.
- (b) $(g \circ f)(x) = g(f(x)) = 4x^2 + 16x + 15, D(g \circ f) = \mathbb{R}$ e $(f \circ g)(x) = f(g(x)) = 4x^2 + 1, D(f \circ g) = \mathbb{R}$.
- (c) $(g \circ f)(x) = g(f(x)) = 3x + 2, D(g \circ f) = \mathbb{R}_+$ e $(f \circ g)(x) = f(g(x)) = \sqrt{3x^2 + 2}, D(f \circ g) = \mathbb{R}$.
- (d) $(g \circ f)(x) = g(f(x)) = \sqrt{x^2 - 2}, D(g \circ f) = (-\infty, -\sqrt{2}] \cup [\sqrt{2}, +\infty)$ e $(f \circ g)(x) = f(g(x)) = x - 2, D(f \circ g) = \mathbb{R}_+.$
- (e) $(g \circ f)(x) = g(f(x)) = \sqrt{3x^2 - 2}, D(g \circ f) = \left(-\infty, -\frac{\sqrt{2}}{\sqrt{3}}\right] \cup \left[\frac{\sqrt{2}}{\sqrt{3}}, +\infty\right)$ e $(f \circ g)(x) = f(g(x)) = 3x - 10, D(f \circ g) = [4, +\infty).$
9. $(f \circ g)(x) = \begin{cases} 9x^2 - 12x + 6 & \text{se } x \geq 1 \\ -\frac{1}{3x} & \text{se } \frac{1}{3} < x < 1 \\ -9x^2 + 12x & \text{se } x \leq \frac{1}{3} \end{cases}$ e $(g \circ f)(x) = \begin{cases} -3x^2 - 4 & \text{se } x \leq -1 \\ \frac{2x-7}{x-2} & \text{se } -1 < x < 1 \\ 3x^2 - 10 & \text{se } x \geq 1 \end{cases}$
10. (a) O gráfico de f é:
- (b) $D(g \circ f) = [-1, 2].$
- (c) $(g \circ f)(x) = \begin{cases} \sqrt{2x+2} & \text{se } -1 \leq x \leq 0 \\ \sqrt{-x^2+4} & \text{se } 0 < x \leq 2 \end{cases}$
11. (a) $f^{-1}(x) = \frac{x-3}{2}$
- (b) $f^{-1}(x) = \frac{1}{x}$
- (c) $f^{-1}(x) = \frac{x-1}{x}$
- (d) $f^{-1}(x) = \frac{x}{x-1}$
- (e) $f^{-1}(x) = \sqrt{x+3}$
- (f) $f^{-1}(x) = x^2 + 4, x \geq 0$

12. (a) Se $b > 0$, $D_f = (-\infty, 0]$. Se $b < 0$, $D_f = [0, +\infty)$. Se $b = 0$, $D_f = \mathbb{R}$.
 (b) $D_f = \mathbb{R}_+$.
 (c) $D_f = \mathbb{R}$.
 (d) $D_f = (-\infty, 3]$.
 (e) $D_f = [-2, 3]$.
 (f) $D_f = \{x \in \mathbb{R} / -1 \leq x \leq 1 \text{ ou } x > 2\}$.
 (g) $D_f = \mathbb{R} \setminus \{-\sqrt{7}, \sqrt{7}\}$
 (h) $D_f = \mathbb{R} \setminus \{-4, 1, 5\}$
 (i) $D_f = [2, +\infty)$.
 (j) $D_f = \left\{ x \in \mathbb{R} / x \leq -\frac{3}{2} \text{ ou } x \geq \frac{5}{2} \right\}$
13. (a) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / x < 3\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = 3\} \\ f(x) < 0 : & \{x \in \mathbb{R} / x > 3\} \end{cases}$
 (b) $\begin{cases} f(x) > 0 : & \left\{ x \in \mathbb{R} / x > \frac{3}{5} \right\} \\ f(x) = 0 : & \left\{ x \in \mathbb{R} / x = \frac{3}{5} \right\} \\ f(x) < 0 : & \left\{ x \in \mathbb{R} / x < \frac{3}{5} \right\} \end{cases}$
 (c) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / x < 2 \text{ ou } x > 3\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = 2 \text{ ou } x = 3\} \\ f(x) < 0 : & \{x \in \mathbb{R} / 2 < x < 3\} \end{cases}$
 (d) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / 0 < x < 4\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = 0 \text{ ou } x = 4\} \\ f(x) < 0 : & \{x \in \mathbb{R} / x < 0 \text{ ou } x > 4\} \end{cases}$
 (e) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / -1 < x < 2 \text{ ou } x > 4\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = -1 \text{ ou } x = 4\} \\ f(x) < 0 : & \{x \in \mathbb{R} / x < -1 \text{ ou } 2 < x < 4\} \end{cases}$
 (f) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / -4 < x < -1 \text{ ou } 1 < x < 3\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = -4 \text{ ou } x = -1 \text{ ou } x = 1 \text{ ou } x = 3\} \\ f(x) < 0 : & \{x \in \mathbb{R} / x < -4 \text{ ou } -1 < x < 1 \text{ ou } x > 3\} \end{cases}$
 (g) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / x < -4 \text{ ou } 2 < x < 3 \text{ ou } x > 4\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = 2 \text{ ou } x = 3\} \\ f(x) < 0 : & \{x \in \mathbb{R} / -4 < x < 2 \text{ ou } 3 < x < 4\} \end{cases}$
14. (a) $D_f = \mathbb{R} \setminus \{-3, 2, 3\}$
 (b) $f(0) = -\frac{2}{3}$
 (c) $f(x) = 0 \Leftrightarrow x = -4$
 (d) $\begin{cases} f(x) > 0 : & \{x \in \mathbb{R} / -4 < x < -3 \text{ ou } x > 2\} \\ f(x) = 0 : & \{x \in \mathbb{R} / x = -4\} \\ f(x) < 0 : & \{x \in \mathbb{R} / x < -4 \text{ ou } -3 < x < 2\} \end{cases}$
15. (a) $y = -3x - 5$ (d) $x = -1$
 (b) $y = -x + 2$ (e) $y = 2x - 7$
 (c) $y = -4$ (f) $y = 2x - 4$
- 16.

$$P = \left(\frac{13}{5}, -\frac{2}{5} \right)$$

(h) $P = (3, 2)$

(c) $P = (0, 0)$

(d) $P = (-2, 4)$

17. (a) $\sin^2 x$

(b) $\cot^2 x$

(c) $-\cos x$

(d) $\sec^2 x$

(e) $4 \cos^4 x - 3 \cos^3 x$

(f) $\cot x$

18. (a) $x + 2$, com resto 0

(b) $5x - 9$, com resto -5

(c) $4x - 5$, com resto $2x + 7$

(d) $3x^2 + x + 1$, com resto 0

19. $A(x) = 10x - x^2$, $0 \leq x \leq 10$

20. $A(x) = \frac{8}{x} + x^2$, $x > 0$

21. (a) F

(b) V

(c) F

(d) F

(e) F

(f) F

(g) V

(h) F