Cálculo diferencial e integral

Respostas dos exercícios

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1 Pré-Cálculo: Funções e modelos

1.

(a) $h(x) = \dfrac{3x^3 + 5x^2 + 2x + 2}{x + 1}$, para $x \neq -1$

(b) $h(x) = \dfrac{x\,(3x + 2)}{x + 1}$, para $x \neq -1$

(c) $h(x) = \dfrac{2x + 5}{(x + 1)^2}$, para $x \neq -1$

(d) $h(x) = \dfrac{x\,(3x + 2)}{(x + 1)^2}$, para $x \neq -1$

(e) $h(x) = \dfrac{3x^2 + 3x + 2}{(x + 1)\,(3x^2 + 2x + 1)}$, para $x \neq -1$

(f) $h(x) = \dfrac{1}{x\,(3x + 2) + 1}$

2. Verificar pelo Wolfram|Alpha. Site: https://www.wolframalpha.com.

3.

(a) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$, $\mathrm{CD}(f) = \mathrm{Im}(f) = \{y \in \mathbb{R}\}$

(b) $\mathrm{D}(h) = \{x \in \mathbb{R} | -2 \leq x \leq 2\}$, $\mathrm{Im}(h) = \{y \in \mathbb{R} | 0 \leq y \leq 2\}$, $\mathrm{CD}(h) = \{y \in \mathbb{R}\}$

(c) $\mathrm{D}(f) = \{u \in \mathbb{R}\}$, $\mathrm{Im}(f) = \{y \in \mathbb{R} | y \geq x\}$, $\mathrm{CD}(f) = \{y \in \mathbb{R}\}$

(d) $\mathrm{D}(f) = \{z \in \mathbb{R}\}$, $\mathrm{Im}(f) = \{y \in \mathbb{R} | y \geq 0\}$, $\mathrm{CD}(f) = \{y \in \mathbb{R}\}$

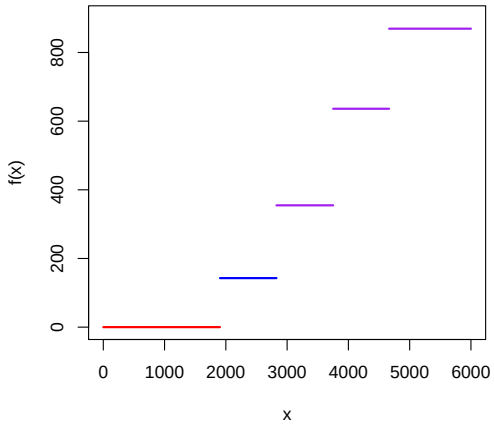
(e) $\mathrm{D}(g) = \{x \in \mathbb{R} | x \neq 0\}$, $\mathrm{Im}(f) = \left\{ y \in \mathbb{R} | y \geq \dfrac{8\sqrt{2}}{3^{3/4}} \right\}$, $\mathrm{CD}(f) = \{y \in \mathbb{R}\}$

(f) $\mathrm{D}(f) = \{x \in \mathbb{R} | x > 0\}$, $\mathrm{Im}(f) = \{y \in \mathbb{R} | 0 < y < 1 \cup y > 6\}$, $\mathrm{CD}(f) = \{y \in \mathbb{R}\}$

(g) $\mathrm{D}(g) = \left\{x \in \mathbb{R} | 0 < x < \sqrt{2} \cup x > \sqrt{2}\right\}$, $\mathrm{Im}(g) = \{y \in \mathbb{R}\}$, $\mathrm{CD}(g) = \{y \in \mathbb{R}\}$

(h) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$, $\mathrm{Im}(f) = \left\{y \in \mathbb{R} | y \leq \frac{13}{3} \cup y = 9\right\}$, $\mathrm{CD}(f) = \{y \in \mathbb{R}\}$

4. (a)



(b) A função é dada por $f(x) = 636.13x$ e em 2 anos, considerando a mesma alíquota, a pessoa pagará R$ 15.267,12. O gráfico deve ser feito no Wolfram|Alpha.

(c) Incremento salarial no período de 1 ano será dado pela função $f(x) = 100x$, logo $f(12) = 100 \times 12 = 1.200$. Já a contribuição ao estado será dada pela função:

$$h(x) = f(x) - g(x) = 233,23x.$$

Dessa forma, $h(12) = 233,23 \times 12 = 2.798,76$. Portanto, ela receberá 1.200 reais e pagará 2.798,76 reais de impostos no período de um ano.

5. (a) Função par (b) Função ímpar (c) Função par
(d) Função par (e) Função par (f) Função ímpar

6. (a) Verificar pelo Wolfram|Alpha.
(b) $m = \frac{5}{9}$ e intercepto $-\frac{160}{9}$

7. (a) $t \approx 9.57$
(b) $f(5.3) \approx 101.21$
(c) Verificar pelo Wolfram|Alpha.

8.

(a) $f \circ g(x) = (x+5)^5$ (b) $f \circ g(x) = \log(x+4)$ (c) $f \circ g(x) = |e^{x^3}|$

(d) $f \circ g(x) = \sqrt{x^2}$ (e) $f \circ g(x) = \cos\, 2x$ (f) $f \circ g(x) = \frac{1}{\mathrm{tg}(x)}$

9. (a) 37 (b) $\log 2 + 4$ (c) e^6 (d) 2 (e) $2\cos 2$ (f) $\mathrm{tg}\, \frac{1}{2}$

10. (a) $\dfrac{x^2+2}{x^2}$ (b) $\left(\dfrac{x+1}{x}\right)^{\frac{3}{2}} + 3$ (c) $\dfrac{2-\cos(2x)}{2\,\mathrm{sen}\, x + 1}$

11.

(a) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$ (b) $\mathrm{D}(f) = \{v \in \mathbb{R} | v \neq 0\}$ (c) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$

(d) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$ (e) $\mathrm{D}(f) = \{t \in \mathbb{R} | -1 \leq t \leq 1\}$ (f) $\mathrm{D}(f) = \{x \in \mathbb{R}\}$

12.

(a) $\mathrm{D}(f) = \{x \in \mathbb{R} | x > 0\}$ (b) $\mathrm{D}(f) = \{x \in \mathbb{R} | x > 0\}$

(c) $\mathrm{D}(f) = \{x \in \mathbb{R} | x < -1 \cup x > 0\}$

13. (a) $f(x) = \dfrac{x^3+2x}{|x|+1}$; (b) $f(x) = \log(x) + x$; ; (c) $f(x) = e^{x^2}$; (d) $f(x) = \sqrt{x}$