Calculo I - P1 2023.1

Carlos Eduardo Carvalho de Souza

September 12, 2023

1. d
2.
3. a
4. a
5. a
6. a

$$f'(x) = \frac{d}{dx}\left(3x^3 - 2x + 1\right)$$
$$f'(x) = 9x^2 - 2$$
$$f'(-1) = 9(-1)^2 - 2 = 9 - 2 = 7$$
$$y = 7x + b$$
$$0 = 7(-1) + b \iff b = 7$$
$$y = 7x + 7$$

7. d

$$-2 + \frac{1}{(-2)^2} = -2 + \frac{1}{4} < 0$$
$$2 + \frac{1}{4} > 0$$

8. a

$$L'(p) = \frac{d}{dx}\left(-p^2 + 5p + 2\right)$$
$$L'(p) = -2p + 5$$
$$-2p + 5 = 0 \implies 2p = 5 \implies p = 2.5$$

9. d

10. c

11.

$f(1) = 1$
$g(1) = 0$
$f'(x) = 2x$
$g'(x) = -2x$

12. b

13. a

$L = ax + b$
$y' = 3x^2$
$L = 3x + b$
$8 = 3 + b \iff b = 5$
$L = 3x + 5$
$L(0) = 5$
$L(x) = 0 \implies x = -\frac{5}{3}$
$\frac{5 \times \frac{5}{3}}{2} = \frac{25}{6}$

14. a

$h(x) = f(x)g(x)$
$h(1) = f(1)g(1)$
$24 = f(1) \times 6 \iff f(1) = 4$

$h'(x) = f'(x)g(x) + f(x)g'(x)$
$h'(1) = f'(1)g(1) + f(1)g'(1)$
$20 = 2 \times 6 + 4g'(1)$
$20 = 12 + 4g'(1)$
$8 = 4g'(1)$
$g'(1) = 2$

15. a

$$f'(x) = \frac{d}{dx}\left(\frac{x^2 - 2x + 3}{x - 1}\right)$$

$$f'(x) = \frac{\frac{d}{dx}(x^2 - 2x + 3)(x - 1) - (x^2 - 2x + 3)\frac{d}{dx}(x - 1)}{(x - 1)^2}$$

$$f'(x) = \frac{(2x - 2)(x - 1) - (x^2 - 2x + 3)}{(x - 1)^2}$$

$$f'(x) = \frac{2x^2 - 2x - 2x + 2 - x^2 + 2x - 3}{(x - 1)^2}$$

$$f'(x) = \frac{x^2 - 2x - 1}{(x - 1)^2}$$