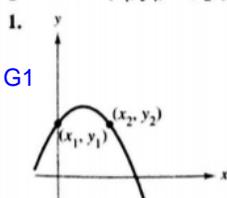


LISTA 2 – DERIVADA

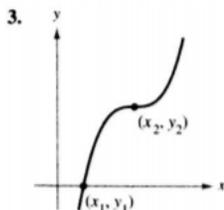
PARTE A

2.1 A DERIVADA E A INCLINAÇÃO DE UM GRÁFICO

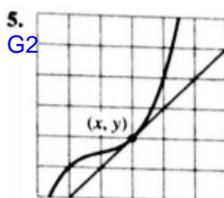
Nos Exercícios 1-4, trace o gráfico e esboce as retas tangentes em (x_1, y_1) e (x_2, y_2) .



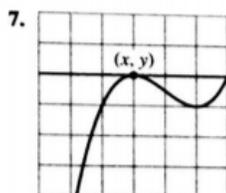
G1



Nos Exercícios 5-10, calcule a inclinação do gráfico no ponto (x, y) . (Cada quadrado da grade tem 1 unidade por 1 unidade).



G2



Nos Exercícios 15-24, utilize a definição por limite para determinar a inclinação da reta tangente ao gráfico de f no ponto dado.

15. $f(x) = 6 - 2x$; (2, 2) 16. $f(x) = 2x + 4$; (1, 6)
 17. $f(x) = -1$; (0, -1) 18. $f(x) = 6$; (-2, 6)
 19. $f(x) = x^2 - 1$; (2, 3) 20. $f(x) = 4 - x^2$; (2, 0)

21. $f(x) = x^3 - x$; (2, 6)
 22. $f(x) = x^3 + 2x$; (1, 3)
 23. $f(x) = 2\sqrt{x}$; (4, 4)

G324. $f(x) = \sqrt{x+1}$; (8, 3)

Nos Exercícios 25-38, utilize a definição por limite para determinar a derivada da função.

25. $f(x) = 3$ 26. $f(x) = -2$
 27. $f(x) = -5x$ 28. $f(x) = 4x + 1$
 29. $g(s) = \frac{1}{3}s + 2$ G4 30. $h(t) = 6 - \frac{1}{2}t$
 31. $f(x) = x^2 - 4$ 32. $f(x) = 1 - x^2$

33. $h(t) = \sqrt{t-1}$

35. $f(t) = t^3 - 12t$

37. $f(x) = \frac{1}{x+2}$

34. $f(x) = \sqrt{x+2}$ G5

36. $f(t) = t^3 + t^2$

38. $g(s) = \frac{1}{s-1}$

Nos Exercícios 39-46, utilize a definição por limite para determinar uma equação da reta tangente ao gráfico de f no ponto dado. Em seguida, confirme os resultados usando uma ferramenta gráfica para traçar o gráfico da função e sua reta tangente no ponto.

39. $f(x) = \frac{1}{2}x^2$; (2, 2)

40. $f(x) = -x^2$; (-1, -1)

41. $f(x) = (x-1)^2$; (-2, 9)

42. $f(x) = 2x^2 - 1$; (0, -1)

43. $f(x) = \sqrt{x+1}$; (4, 3)

44. $f(x) = \sqrt{x+2}$; (7, 3)

45. $f(x) = \frac{1}{x}$; (1, 1)

46. $f(x) = \frac{1}{x-1}$; (2, 1)

G6

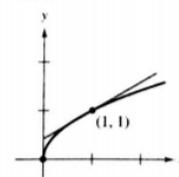
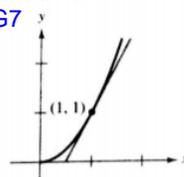
2.2 ALGUMAS REGRAS DE DERIVAÇÃO

Nos Exercícios 1-4, determine a inclinação da reta tangente a $y = x^n$ no ponto (1, 1)

1. (a) $y = x^2$

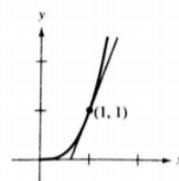
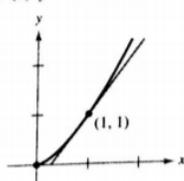
(b) $y = x^{1/2}$

G7



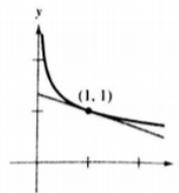
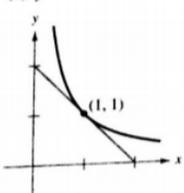
2. (a) $y = x^{3/2}$

(b) $y = x^3$



3. (a) $y = x^{-1}$

(b) $y = x^{-1/3}$

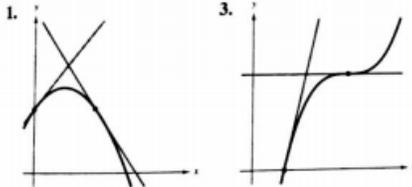


RESPOSTAS

SEÇÃO 2.1 (página 115)

Recapitulação (página 115)

1. $x = 2$ 2. $y = 2$ 3. $y = -x + 2$
 4. $2x$ 5. $3x^2$ 6. $\frac{1}{x^2}$ 7. $2x$
 8. $(-\infty, 1) \cup (1, \infty)$ 9. $(-\infty, \infty)$
 10. $(-\infty, 0) \cup (0, \infty)$



5. $m = 1$ 7. $m = 0$ 9. $m = -\frac{1}{3}$
 11. 2002: $m \approx 200$ 13. $t = 1$: $m \approx 65$
 2004: $m \approx 500$ $t = 8$: $m = 0$
 $t = 12$: $m \approx -1000$
 15. $f'(x) = -2$ 17. $f'(x) = 0$
 $f'(2) = -2$ $f'(0) = 0$
 19. $f'(x) = 2x$ 21. $f'(x) = 3x^2 - 1$
 $f'(2) = 4$ $f'(2) = 11$
 23. $f'(x) = \frac{1}{\sqrt{x}}$
 $f'(4) = \frac{1}{2}$
 25. $f(x) = 3$
 $f(x + \Delta x) = 3$
 $f(x + \Delta x) - f(x) = 0$
 $\frac{f(x + \Delta x) - f(x)}{\Delta x} = 0$

$$\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = 0$$

27. $f(x) = -5x$
 $f(x + \Delta x) = -5x - 5\Delta x$
 $f(x + \Delta x) - f(x) = -5\Delta x$
 $\frac{f(x + \Delta x) - f(x)}{\Delta x} = -5$
 $\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = -5$

29. $g(s) = \frac{1}{3}s + 2$
 $g(s + \Delta s) = \frac{1}{3}s + \frac{1}{3}\Delta s + 2$
 $g(s + \Delta s) - g(s) = \frac{1}{3}\Delta s$
 $\frac{g(s + \Delta s) - g(s)}{\Delta s} = \frac{1}{3}$
 $\lim_{\Delta s \rightarrow 0} \frac{g(s + \Delta s) - g(s)}{\Delta s} = \frac{1}{3}$

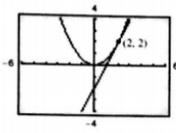
31. $f(x) = x^2 - 4$
 $f(x + \Delta x) = x^2 + 2x\Delta x + (\Delta x)^2 - 4$
 $f(x + \Delta x) - f(x) = 2x\Delta x + (\Delta x)^2$
 $\frac{f(x + \Delta x) - f(x)}{\Delta x} = 2x + \Delta x$
 $\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = 2x$

33. $h(t) = \sqrt{t-1}$
 $h(t + \Delta t) = \sqrt{t + \Delta t - 1}$
 $h(t + \Delta t) - h(t) = \sqrt{t + \Delta t - 1} - \sqrt{t - 1}$
 $\frac{h(t + \Delta t) - h(t)}{\Delta t} = \frac{1}{\sqrt{t + \Delta t - 1} + \sqrt{t - 1}}$
 $\lim_{\Delta t \rightarrow 0} \frac{h(t + \Delta t) - h(t)}{\Delta t} = \frac{1}{2\sqrt{t-1}}$

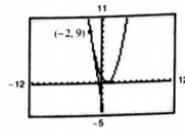
35. $f(t) = t^3 - 12t$
 $f(t + \Delta t) = t^3 + 3t^2\Delta t + 3t(\Delta t)^2 + (\Delta t)^3 - 12t - 12\Delta t$
 $f(t + \Delta t) - f(t) = 3t^2\Delta t + 3t(\Delta t)^2 + (\Delta t)^3 - 12\Delta t$
 $\frac{f(t + \Delta t) - f(t)}{\Delta t} = 3t^2 + 3t\Delta t + (\Delta t)^2 - 12$
 $\lim_{\Delta t \rightarrow 0} \frac{f(t + \Delta t) - f(t)}{\Delta t} = 3t^2 - 12$

37. $f(x) = \frac{1}{x+2}$
 $f(x + \Delta x) = \frac{1}{x + \Delta x + 2}$
 $f(x + \Delta x) - f(x) = \frac{-\Delta x}{(x + \Delta x + 2)(x + 2)}$
 $\frac{f(x + \Delta x) - f(x)}{\Delta x} = \frac{-1}{(x + \Delta x + 2)(x + 2)}$
 $\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = -\frac{1}{(x + 2)^2}$

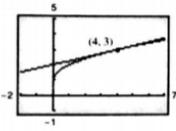
39. $y = 2x - 2$



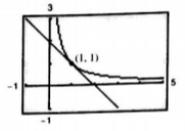
41. $y = -6x - 3$



43. $y = \frac{x}{4} + 2$



45. $y = -x + 2$



47. $y = -x + 1$

SEÇÃO 2.2 (página 126)

Recapitulação (página 126)

1. (a) 8 (b) 16 (c) $\frac{1}{2}$

2. (a) $\frac{1}{36}$ (b) $\frac{1}{32}$ (c) $\frac{1}{64}$

3. $4x(3x^2 + 1)$ 4. $\frac{3}{2}x^{1/2}(x^{3/2} - 1)$ 5. $\frac{1}{4x^{3/4}}$

6. $x^2 - \frac{1}{x^{1/2}} + \frac{1}{3x^{2/3}}$ 7. $0, -\frac{2}{3}$

8. $0, \pm 1$ 9. $-10, 2$ 10. $-2, 12$

23. Função: $y = \frac{1}{x^3}$

Reescreva: $y = x^{-3}$

Derive: $y' = -3x^{-4}$

Simplifique: $y' = -\frac{3}{x^4}$

25. Função: $y = \frac{1}{(4x)^3}$

Reescreva: $y = \frac{1}{64}x^{-3}$

Derive: $y' = -\frac{3}{64}x^{-4}$

Simplifique: $y' = -\frac{3}{64x^4}$

27. Função: $y = \frac{\sqrt{x}}{x}$

Reescreva: $y = x^{-1/2}$

Derive: $y' = -\frac{1}{2}x^{-3/2}$

Simplifique: $y' = -\frac{1}{2x^{3/2}}$

29. -1 31. -2 33. 4 35. $2x + \frac{4}{x^2} + \frac{6}{x^3}$

37. $2x - 2 + \frac{8}{x^3}$ 39. $3x^2 + 1$ 41. $6x^2 + 16x - 1$

43. $\frac{2x^3 - 6}{x^3}$ 45. $\frac{4x^3 - 2x - 10}{x^3}$ 47. $\frac{4}{5x^{1/5}} + 1$