Lista Derivadas

1) $f(x) = x^2$

$f'(x) = 2x$

$f''(x) = 2$

2) $f(x) = 2x^2 + x$

$f'(x) = 4x + 1$

$f''(x) = 4$

3) $f(x) = 3x^3 + 5x^2 - x$

$f'(x) = 9x^2 + 10x - 1$

$f''(x) = 18x + 10$

4) $f(x) = x^3 + 1$

$f'(x) = 3x^2$

$f''(x) = 6x$

5) $f(x) = 10 + x^3$

$f'(x) = 3x^2$

$f''(x) = 6x$

6) $f(x) = 15 - \dfrac{x^3}{3}$

$f'(x) = -\dfrac{3x^2}{3} = -x^2$

$f''(x) = -2x$

7) $f(x) = x^2 + x^3 + x^4$

$f'(x) = 2x + 3x^2 + 4x^3$

$f''(x) = 2 + 6x + 12x^2$

8) $f(x) = x^2 + 2x - \sqrt{x}$

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

$= 2x + 2 - \dfrac{1}{2\sqrt{x}}$

$f''(x) = 2 + \frac{1}{4}x^{-3/2} = 2 + \dfrac{1}{4\sqrt{x^3}}$

9) $f(x) = \underset{*}{\sqrt{3x}} - \underset{**}{(3x)^2}$

* regra da cadeia

$g(x) = \sqrt{3x}$ $\begin{cases} u(x) = 3x \Rightarrow u'(x) = 3 \\ g(u) = \sqrt{u} \Rightarrow g'(u) = \frac{1}{2}u^{-1/2} \end{cases}$

$g'(x) = g'(u)\, u'(x)$

$= \frac{1}{2}u^{-1/2} \cdot 3$

$= \dfrac{3}{2\sqrt{3x}}$

** regra da cadeia

$g(x) = (3x)^2$ $\begin{cases} u(x) = 3x \Rightarrow u'(x) = 3 \\ g(u) = u^2 \Rightarrow g'(u) = 2u \end{cases}$

$g'(x) = g'(u)\, u'(x)$

$= 2u \cdot 3 = 6u = 6(3x) = 18x$

logo, $f'(x) = \underset{*}{\dfrac{3}{2\sqrt{3x}}} - 18x$

* $g(x) = \frac{3}{2} \cdot \underbrace{(3x)^{-1/2}}_{\text{regra da cadeia}}$

$\begin{cases} u(x) = 3x \Rightarrow u'(x) = 3 \\ g(u) = \frac{3}{2}u^{-1/2} \Rightarrow g'(u) = -\frac{3}{4}u^{-3/2} \end{cases}$

$g'(x) = 3 \cdot \left(-\frac{3}{4}u^{-3/2}\right)$

$g'(x) = -\dfrac{9}{4\sqrt{(3x)^3}}$

logo, $f''(x) = -\dfrac{9}{4\sqrt{(3x)^3}} - 18$

10) $f(x) = \underbrace{(2x-1)}_{u(x)}\underbrace{(3x+4)}_{v(x)}$

$u(x) = 2x-1 \Rightarrow u'(x) = 2$

$v(x) = 3x+4 \Rightarrow v'(x) = 3$

$$f'(x) = u'(x)v(x) + u(x)v'(x)$$
$$= 2(3x+4) + (2x-1).3$$
$$= 6x + 8 + 6x - 3$$
$$= \underline{12x + 5}$$

$$f''(x) = \underline{12}$$

11) $f(x) = \underbrace{(x^3-x^2)}_{u(x)}\underbrace{(x^2+4)}_{v(x)}$

$u(x) = x^3 - x^2 \Rightarrow u'(x) = 3x^2 - 2x$

$v(x) = x^2+4 \Rightarrow v'(x) = 2x$

$$f'(x) = u'(x)v(x) + u(x)v'(x)$$
$$= (3x^2-2x)(x^2+4) + (x^3-x^2)(2x)$$
$$= 3x^4 + 12x^2 - 2x^3 - 8x + 2x^4 - 2x^3$$
$$= 5x^4 - 4x^3 + 12x^2 - \underline{8x}$$

$$f''(x) = 20x^3 - 12x^2 + 24x \underline{- 8}$$

12) $f(x) = \underbrace{(x^5-2x^3)}_{u(x)}\underbrace{(1-x^2)}_{v(x)}$

$u(x) = x^5 - 2x^3 \Rightarrow u'(x) = 5x^4 - 6x^2$

$v(x) = 1 - x^2 \Rightarrow v'(x) = -2x$

$$f'(x) = u'(x)v(x) + u(x)v'(x)$$
$$= (5x^4-6x^2)(1-x^2) + (x^5-2x^3)(-2x)$$
$$= 5x^4 - 5x^6 - 6x^2 + 6x^4 - 2x^6 + 4x^4$$
$$= -7x^6 + 15x^4 - \underline{6x^2}$$
$$f''(x) = -42x^5 + 60x^3 - \underline{12x}$$

13) $f(x) = \underbrace{x}_{u(x)}\underbrace{(x^3+4)}_{v(x)}$ $\quad u(x) = x \Rightarrow u'(x) = 1$

$v(x) = x^3+4 \Rightarrow v'(x) = 3x^2$

$$f'(x) = u'(x)v(x) + u(x)v'(x)$$
$$= 1(x^3+4) + x(3x^2)$$
$$= x^3+4+3x^3$$
$$= \underline{4x^3+4}$$

$$f''(x) = \underline{12x^2}$$

14) $f(x) = \dfrac{2x+3}{x}$ $\quad \to u(x) = 2x+3 \Rightarrow u'(x) = 2$

$\to v(x) = x \Rightarrow v'(x) = 1$

$$f'(x) = \frac{u'(x)v(x) - u(x)v'(x)}{[v(x)]^2}$$

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

$\to u(x) = 3 \to u'(x) = 0$

$\to v(x) = x^2 \to v'(x) = 2x$

$$f''(x) = -\frac{[0(x^2) - 3(2x)]}{(x^2)^2}$$

$$= \frac{6\cancel{x}}{x^{\cancel{4}}} = \frac{6}{x^3}$$

15) $f(x) = \dfrac{x^2-2}{x^3}$ $\quad \to u(x) = x^2-2 \to u'(x) = 2x$

$\to v(x) = x^3 \to v'(x) = 3x^2$

$$f'(x) = \frac{2x(x^3) - (x^2-2)(3x^2)}{(x^3)^2} = \frac{2x^4 - 3x^4 + 6x^2}{x^6} = \frac{-x^{\cancel{4}} + 6\cancel{x^2}}{x^{\cancel{6}}}$$

$$= \frac{-x^2+6}{x^4}$$

$\to u(x) = -x^2+6 \to u'(x) = -2x$

$\to v(x) = x^4 \to v'(x) = 4x^3$

$$f''(x) = \frac{(-2x)(x^4) - (-x^2+6)(4x^3)}{(x^4)^2} = \frac{-2x^5 + 4x^5 - 24x^3}{x^8} = \frac{2x^{\cancel{5}} - 24\cancel{x^3}}{x^{\cancel{8}}} = \frac{2x^2 - 24}{x^5}$$

16) $f(x) = \dfrac{x^3 - 2x}{\sqrt{x}}$ $\rightarrow u(x) = x^3 - 2x \rightarrow u'(x) = 3x^2 - 2$

$\rightarrow v(x) = \sqrt{x} = x^{1/2} \rightarrow v'(x) = \frac{1}{2} x^{-1/2} = \frac{1}{2\sqrt{x}}$

$$f'(x) = \frac{u'(x)v(x) - u(x)v'(x)}{[v(x)]^2}$$

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

$$= \frac{3x^{3/2} - x^{1/2} - \frac{1}{2}x^{5/2}}{x} = \frac{\frac{6x^{3/2} - 2x^{1/2} - x^{5/2}}{2}}{x} = \frac{6x^{3/2} - 2x^{1/2} - x^{5/2}}{2x}$$

$$= \frac{6x^{1/2} - 2x^{-1/2} - x^{3/2}}{2} = 6\sqrt{x} - \frac{1}{\sqrt{x}} - \frac{\sqrt{x^3}}{2}$$

17) $f(x) = \dfrac{2x+1}{x+5}(3x-1) = \dfrac{6x^2 - 2x + 3x - 1}{x+5} = \dfrac{6x^2 + x - 1}{x+5}$

$\rightarrow u(x) = 6x^2 + x - 1$
$u'(x) = 12x + 1$

$\rightarrow v(x) = x + 5$
$v'(x) = 1$

$$f'(x) = \frac{u'(x)v(x) - u(x)v'(x)}{[v(x)]^2}$$

$$f'(x) = \frac{(12x+1)(x+5) - (6x^2 + x - 1)\,1}{[(x+5)]^2} = \frac{12x^2 + 60x + \cancel{x} + 5 - 6x^2 - \cancel{x} + 1}{(x+5)^2}$$

$$= \frac{6x^2 + 60x + 6}{(x+5)^2}$$

18) $f(x) = (\underbrace{2x-1}_{u(x)})^2$ regra da cadeia

$f(u) = u^2 \rightarrow f'(u) = 2u$
$u(x) = 2x - 1 \rightarrow u'(x) = 2$

$$f'(x) = f'(u).u'(x)$$
$$= 2u.2 = 4u = 4(2x-1)$$
$$= 8x - 4$$

19) $f(x) = (\underbrace{x^3 - x^2}_{u(x)})^3$ regra da cadeia

$$f(u) = u^3 \rightarrow f'(u) = 3u^2$$
$$u(x) = x^3 - x^2 \rightarrow u'(x) = 3x^2 - 2x$$

$$\begin{aligned} f'(x) &= f'(u) \cdot u'(x) \\ &= 3u^2 (3x^2 - 2x) \\ &= 3(x^3 - x^2)^2 (3x^2 - 2x) \\ &= (x^3 - x^2)^2 (9x^2 - 6x) \end{aligned}$$

20) $f(x) = \sqrt{\underbrace{x^5 - 2x^3 - 4x^2}_{u(x)}}$ * regra cadeia

$$f(u) = \sqrt{u} \rightarrow f'(u) = \frac{1}{2} u^{-1/2}$$
$$u(x) = x^5 - 2x^3 - 4x^2 \rightarrow u'(x) = 5x^4 - 6x^2 - 8x$$

$$\begin{aligned} f'(x) &= f'(u)\, u'(x) \\ &= \frac{1}{2\sqrt{u}} (5x^4 - 6x^2 - 8x) \\ &= \frac{5x^4 - 6x^2 - 8x}{2\sqrt{x^5 - 2x^3 - 4x^2}} \end{aligned}$$

21) $f(x) = \underbrace{(x^3 + 4)^3}_{*} + \underbrace{(2x - 1)^4}_{**} - \underbrace{(5x - 4)^2}_{***}$

* $u(x) = x^3 + 4 \Rightarrow u'(x) = 3x^2$
$g(u) = u^3 \Rightarrow g'(u) = 3u^2$

$$\begin{aligned} g'(x) &= g'(u)\, u'(x) \\ &= 3u^2 \cdot 3x^2 \\ &= 9x^2 (x^3 + 4)^2 \end{aligned}$$

** $u(x) = (2x - 1) \Rightarrow u'(x) = 2$
$g(u) = u^4 \Rightarrow g'(u) = 4u^3$

$$\begin{aligned} g'(x) &= g'(u)\, u'(x) \\ &= 4u^3 \cdot 2 = 8u^3 = 8(2x - 1)^3 \end{aligned}$$

*** $u(x) = 5x - 4 \Rightarrow u'(x) = 5$
$g(u) = u^2 \Rightarrow g'(u) = 2u$

$$\begin{aligned} g'(x) &= g'(u)\, u'(x) \\ &= 2u \cdot 5 = 10u = 10(5x - 4) \\ &= 50x - 40 \end{aligned}$$

$$f'(x) = 9x^2 (x^3 + 4)^2 + 8(2x - 1) - (50x - 40)$$

22) $f(x) = 3^x$ * função exponencial

$f(x) = a^x \rightarrow f'(x) = a^x \ln(a)$

$f'(x) = 3^x \ln(3)$

23) $f(x) = 4^{\underbrace{-2x}_{u}}$ * função exponencial com regra da cadeia

$f(u) = 4^u \rightarrow f'(u) = 4^u \ln(4)$
$u(x) = -2x \rightarrow u(x) = -2$
} $f'(x) = f'(u)\, u'(x)$

$= 4^u \ln(4)(-2)$

$= \underline{-2\ln(4)\,4^{-2x}}$

esses nº não podem ser x

24) $f(x) = 2^{7x^2}$ * função exponencial com regra da cadeia

$f(u) = 2^u \rightarrow f'(u) = 2^u \ln(2)$
$u(x) = 7x^2 \rightarrow u'(x) = 14x$
} $f'(x) = f'(u)\, u'(x)$

$= 2^u \ln(2)(14x)$

$= 14x \ln(2)\, 2^{7x^2}$

25) $f(x) = \underbrace{(x^3+3)}_{w(x)}(2^{-7x})$ * regra produto + função exp + regra cadeia)

*

$f(u) = 2^u$
$u(x) = -7x$
} $f'(x) = f'(u)\, u'(x) = 2^u \ln(2).(-7)$

$= \underline{-7\ln(2)\, 2^{-7x}}$ $v'(x)$

* produto

$f'(x) = w'(x)\, v(x) + w(x)\, v'(x)$

$= 3x^2(2^{-7x}) + (x^3+3)(-7\ln(2)\, 2^{-7x})$

26) $f(x) = e^{2x}$ $\downarrow$ $u(x)$ * função exponencial + regra cadeia

$f(x) = e^x \rightarrow f'(x) = e^x$

$f(u) = e^u \rightarrow f'(u) = e^u$
$u(x) = 2x \rightarrow u'(x) = 2$
} $f'(x) = f'(u)\, u'(x)$

$= e^u (2)$

$= \underline{2e^{2x}}$ $|_u$

27) $f(x) = e^{\overset{(x+1)}{\underset{u(x)}{}}}$ * função exponencial + regra cadeia

$f(u) = e^u \rightarrow f'(u) = e^u$
$u(x) = x+1 \rightarrow u'(x) = 1$

$f'(x) = f'(u)\,u'(x)$
$= e^u \cdot 1$
$= e^{x+1}$

28) $f(x) = \log_2 \underset{u(x)}{(5x)}$ * função logarítmica + regra cadeia

$f(x) = \log_a(x) \rightarrow f'(x) = \dfrac{1}{x \ln(a)}$

$f(u) = \log_2 u \rightarrow f'(u) = \dfrac{1}{u \ln(2)}$
$u(x) = 5x \rightarrow u'(x) = 5$

$f'(x) = f'(u)\,u'(x)$
$= \dfrac{1}{u \ln(2)} \cdot 5 = \dfrac{\cancel{5}}{\cancel{5}x \cdot \ln(2)} = \dfrac{1}{x \ln(2)}$

29) $f(x) = \log_4 \underset{u(x)}{(x^2+4x)}$ * função log + regra cadeia

$f(u) = \log_4 u \rightarrow f'(u) = \dfrac{1}{u \ln(4)}$
$u(x) = x^2+4x \rightarrow u'(x) = 2x+4$

$f'(x) = f'(u)\,u'(x)$
$= \dfrac{1}{u \ln(4)} \cdot (2x+4) = \dfrac{2x+4}{(x^2+4x)\ln(4)}$

30) $f(x) = \log_3 \underset{u(x)}{(x^3+1)}$ * função log + regra cadeia

$f(u) = \log_3 u \rightarrow f'(u) = \dfrac{1}{u \ln(3)}$
$u(x) = x^3+1 \rightarrow u'(x) = 3x^2$

$f'(x) = f'(u)\,u'(x)$
$= \dfrac{1}{u \ln(3)} (3x^2) = \dfrac{3x^2}{(x^3+1)\ln(3)}$

31) $f(x) = \overset{\ln}{\log_e}(3x^2+15x) = \ln \underset{u(x)}{(3x^2+15x)}$ * função log + regra da cadeia

$f(x) = \ln(x) \rightarrow f'(x) = \dfrac{1}{x}$

$f(u) = \ln(u) \rightarrow f'(u) = 1/u$
$u(x) = 3x^2+15x \rightarrow u'(x) = 6x+15$

$f'(x) = f'(u)\,u'(x)$
$= \dfrac{1}{u} (6x+15) = \dfrac{6x+15}{3x^2+15x}$

32) $f(x) = \ln\left(\frac{x+1}{2x^2}\right)$ função log + regra cadeia + regra quociente

$$u(x) = \frac{g(x)}{w(x)} \Rightarrow u'(x) = \frac{g'(x)w(x) - g(x)w'(x)}{[w(x)]^2}$$

$$= \frac{1(2x^2) - (x+1)4x}{4x^4} = \frac{2x^2 - 4x^2 - 4x}{4x^4}$$

$$= \frac{-2x^{\cancel{2}} - 4\cancel{x}}{4x^{\cancel{4}}} = \frac{-x-2}{2x^3}$$

$$f(u) = \ln(u) \rightarrow f'(u) = \frac{1}{u}$$

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

$$f'(x) = f'(u)\,u'(x)$$

$$= \frac{1}{\left(\frac{x+1}{2x^2}\right)} \cdot \frac{-x-2}{2x^3} = \frac{\cancel{2}x^{\cancel{2}}}{x+1} \cdot \frac{(-x-2)}{\cancel{2}x^{\cancel{3}}}$$

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

33) $f(x) = \ln\underbrace{(x+1)}_{\downarrow *\ u(x)} - \ln\underbrace{(2x^2)}_{\downarrow **\ u(x)}$ função log + regra da cadeia

$* \quad g(u) = \ln(u) \rightarrow g'(u) = \frac{1}{u}$

$\quad u(x) = x+1 \rightarrow u'(x) = 1$

$$g'(x) = g'(u)\,u'(x) = \frac{1}{u} \cdot 1 = \frac{1}{x+1}$$

$** \quad g(u) = \ln(u) \rightarrow g'(u) = \frac{1}{u}$

$\quad u(x) = 2x^2 \rightarrow u'(x) = 4x$

$$g'(x) = g'(u)\,u'(x) = \frac{1}{u} \cdot 4x = \frac{\cancel{4}x}{\cancel{2}x^{\cancel{2}}} = \frac{2}{x}$$

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

34) $f(x) = (5x^3 + 3x^2 - 2x)\underbrace{(e^{-7x})}$ função exp + regra cadeia + regra produto

$$v(x) = e^{-7x} \quad u(x)$$

$v(u) = e^u \rightarrow v'(u) = e^u$

$u(x) = -7x \rightarrow u'(x) = -7$

$$v'(x) = e^u \cdot (-7) = -7e^{-7x}$$

$$f'(x) = u'(x)v(x) + u(x)v'(x)$$

$$= (15x^2 + 6x - 2)e^{-7x} + (5x^3 + 3x^2 - 2x)(-7e^{-7x})$$

35) $f(x) = (x^3+3)(\underbrace{e^{3x^2}})$ * função exp + regra cadeia + regra produto

$v(x) = e^{3x^2}$ $u(x)$

$v(u) = e^u \rightarrow v'(u) = e^u$
$u(x) = 3x^2 \rightarrow u'(x) = 6x$
$\Big\}$ $v'(x) = v'(u)\,u'(x)$
$= e^u.(6x)$
$= 6xe^{-3x^2}$

$f'(x) = u'(x)\,v(x) + u(x)\,v'(x)$
$= 3x^2(e^{3x^2}) + (x^3+3)(6xe^{-3x^2})$

36) $f(x) = \dfrac{x^2+1}{\underbrace{e^{(x-1)}}}$ * função exp + regra cadeia + regra quociente

$v(x) = e^{(x-1)}$ $u(x)$

$v(u) = e^u \rightarrow v'(u) = e^u$
$u(x) = x-1 \rightarrow u'(x) = 1$
$\Big\}$ $v'(x) = v'(u)\,u'(x)$
$= e^u.1 = e^{x-1}$

$f'(x) = \dfrac{u'(x)\,v(x) - u(x)\,v'(x)}{[v(x)]^2} = \dfrac{2x[\cancel{e^{(x-1)}}] - (x^2+1)\,\cancel{e^{(x-1)}}}{[e^{(x-1)}]^{\cancel{2}}}$

$= \dfrac{2x - x^2 - 1}{e^{(x-1)}}$

37) $f(x) = \dfrac{e^{(x-1)}}{\underbrace{\ln(x^2)}_{w(x)}}$ → é o $v'(x)$ do exercício 36

* função exp + função log + regra cadeia + regra quociente

$w(x) = \ln x^2$

$w(u) = \ln(u) \rightarrow w'(u) = \dfrac{1}{u}$
$u(x) = x^2 \rightarrow u'(x) = 2x$
$\Big\}$ $w'(x) = w'(u)\,u'(x)$
$= \dfrac{1}{u}.2x = \dfrac{2x}{x^{\cancel{2}}} = \dfrac{2}{x}$

$f'(x) = \dfrac{v'(x)\,w(x) - v(x)\,w'(x)}{[w(x)]^2}$

$= \dfrac{e^{x-1}[\ln(x^2)] - e^{(x-1)}.\frac{2}{x}}{[\ln(x^2)]^2}$

38) $f(x) = \dfrac{e^{(2x-2)}}{e^{(2x^2-4)}}$ $\}\, g(x)$, $\}\, w(x)$ função exp + regra cadeia + regra quociente

$g(x) = e^{\overset{(2x-2)}{\downarrow\, u(x)}}$ $\begin{cases} g(u) = e^u \rightarrow g'(u) = e^u \\ u(x) = 2x-2 \rightarrow u'(x) = 2 \end{cases}$ $g'(x) = g'(u)\, u'(x)$
$= e^u . 2 = 2e^{2x-2}$

$w(x) = e^{\overset{(2x^2-4)}{\downarrow\, u(x)}}$ $\begin{cases} w(u) = e^u \rightarrow w'(u) = e^u \\ u(x) = 2x^2-4 \rightarrow u'(x) = 4x \end{cases}$ $w'(x) = w(u)\, u'(x)$
$= e^u . (4x) = 4x e^{2x^2-4}$

$$f'(x) = \frac{g'(x)\, w(x) - g(x)\, w'(x)}{[w(x)]^2}$$

$$= \frac{2e^{(2x-2)} . \cancel{e^{(2x^2-4)}} - e^{(2x-2)} . 4x \cancel{e^{(2x^2-4)}}}{[e^{(2x^2-4)}]^{\cancel{2}}} = \frac{2e^{(2x-2)} - e^{(2x-2)}}{e^{(2x^2-4)}} = \frac{e^{(2x-2)}}{e^{(2x^2-4)}} = f(x)$$

39) $f(x) = \underbrace{6^{7x^2}}_{g(x)} \underbrace{(e^{x^2})}_{w(x)}$ funções exp + regra cadeia + regra produto

$g(x) = 6^{\overset{7x^2}{\downarrow\, u(x)}}$ $\begin{cases} g(u) = 6^u \rightarrow g'(u) = 6^u \ln(6) \\ u(x) = 7x^2 \rightarrow u'(x) = 14x \end{cases}$ $g'(x) = g'(u)\, u'(x)$
$= 6^{7x^2} \ln(6) . 14x$

$w(x) = e^{x^2}$ $u(x)$ $\begin{cases} w(u) = e^u \rightarrow w'(u) = e^u \\ u(x) = x^2 \rightarrow u'(x) = 2x \end{cases}$ $w'(x) = w'(u)\, u'(x)$
$= e^{x^2} . 2x$

$$f'(x) = g'(x)\, w(x) + g(x)\, w'(x)$$

$$= 6^{7x^2} \ln(6) . 14x\, e^{x^2} + 6^{7x^2} . e^{x^2}\, 2x$$

$$= 6^{7x^2} . e^{x^2}\, 2x \left[7 \ln(6) + 1 \right]$$

40) $f(x) = \dfrac{6^{7x^2}\} g(x)}{e^{x^2}\} w(x)}$

OBS: suas derivadas $g'(x)$ e $w'(x)$ foram obtidas no exercício 39

$$f'(x) = \frac{g'(x)w(x) - g(x)w'(x)}{[w(x)]^2}$$

$$= \frac{6^{7x^2}\ln(6)14x\,\cancel{e^{x^2}} - 6^{7x^2}\,\cancel{e^{x^2}}.2x}{[e^{x^2}]^{\cancel{2}}} = \frac{6^{7x^2}\ln(6)14x - 6^{7x^2}.2x}{e^{x^2}}$$

41) $f(x) = \underbrace{6^{7x^2}}_{g(x)} + \underbrace{e^{x^2}}_{w(x)}$

OBS: suas derivadas $g'(x)$ e $w'(x)$ foram obtidas no exercício 39 e utilizadas também no exercício 40.

$$f'(x) = g'(x) + w'(x)$$

$$= 6^{7x^2}\ln(6)14x + e^{x^2}.2x$$