Problemario final

cálculo diferencial

$u'v + uv'$

1: $f(x) = x^2 \cdot \operatorname{Sin}(x)$

$f(x)' = (2x^{2-1})(\operatorname{Sin}(x)) + (x^2)(\operatorname{Cos}(x))$

$f(x)' = 2x \cdot \operatorname{Sin}(x) + x^2 \cdot \operatorname{Cos}(x)$

2: $f(x) = \dfrac{2x+1}{x^2-1}$

$f(x)' = \dfrac{(2x^{1-1} + \not{0})(x^2-1) - (2x+1)(2x^{2-1} - \not{0})}{(x^2-1)^2}$

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

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

3: $f(x) = (x^2+1) \cdot (\operatorname{Cos}(x))$

$f(x)' = (2x^{2-1} + 0) \cdot (\operatorname{Cos}(x)) + (x^2+1)(-\operatorname{Sen}(x))$

$f(x)' = (2x)(\operatorname{Cos}(x)) + (x^2+1)(-\operatorname{Sen}(x))$

4: $f(x) = e^{(2x)} \cdot \operatorname{In}(x)$

$f(x)' = (e^{2x} \cdot 2x^{1-1})(\operatorname{In}(x)) + (e^{2x})\left(\frac{1}{x}\right)$

$f(x)' = (2e^{2x})(\operatorname{In}(x)) + (e^{2x}/x)$

6: $f(x) = (2x^3+5)^4 (3x-1)^2$

$U = 2x^3 + 5 \qquad V = 3x - 1$

$U' = 6x^2 \qquad V' = 3$

$f(x)' = U'V + UV'$

$f(x)' = (4U^{4-1})(V^2) + (U^4)(2V^{2-1})$

$f(x)' = 4U^3 \cdot V^2 + U^4 \cdot 2V$

$f(x)' = 4(6x^2)^3 \cdot (3x-1)^2 + (2x^3+5)^4 \cdot (3)^2$

$f(x)' = (24x^2)^3 \cdot (3x-1)^2 + (2x^3+5)^4 \cdot 9$

$f(x)' = (24x^2)^3 \cdot (3x-1)^2 + (18x^2+45)^4$

7: $f(x) = (\operatorname{Sin}(x))^3 (\operatorname{Cos}(x))^2$

$U = \operatorname{Sin} x \qquad V = \operatorname{Cos} x$

$U' = \operatorname{Cos} x \qquad V' = -\operatorname{Sin} x$

$f(x)' = U'V + UV'$

$f(x)' = (3U^{3-1})(V^2) + (U^3)(2V^{2-1})$

$f(x)' = 3U^2 V^2 + U^3 2V$

$f(x)' = 3(\operatorname{Cos}(x))^2 \cdot (\operatorname{Cos}(x))^2 + (\operatorname{Sin}(x))^3 \cdot 2(-\operatorname{Sin}(x))$

$f(x)' = (3\operatorname{Cos}(x))^2 \cdot (\operatorname{Cos}(x))^2 + (\operatorname{Sin}(x))^3 \cdot (-2\operatorname{Sin}(x))$

8: $f(x) = \dfrac{e^{(2x^2+5x)}}{2x+1}$

$f(x)' = \dfrac{(e^{(2x^2+5x)}) \cdot (4x+5) \cdot (2x+1) - (e^{(2x^2+5x)})(2)}{(2x+1)^2}$

$f(x)' = \dfrac{(e^{(2x^2+5x)})(8x^2+14x+5) - (2e^{(2x^2+5x)})}{(2x+1)^2}$

9: $f(x) = \dfrac{\ln(2x+1)^2}{(x^2+1)}$

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

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

10: $f(x) = (1+x^2)^3 \cdot \cos(x^2+2)$

$U = 1+x^2$ $\qquad V = \cos(x^2+2)$

$U' = 2x^{2-1} = 2x$ $\qquad V' = -\sin(x^2+2)\cdot(-2x)$

$(U^3)' = 3U^2$

$f(x)' = U'V + UV'$

$f(x)' = 3U^2V + UV'$

$f(x)' = 3(1+x^2)^2 \cdot (\cos(x^2+2)) + (1+x^2)^3(-\sin(x^2+2)\cdot(2x))$

11: $f(x) = \ln(2x^3 - 4x + 5)$

$y = 2x^3 - 4x + 5$

$y' = 6x^{3-1} - 4x^{1-1} + \cancel{0}$

$y' = 6x^2 - 4$

$f(x)' = \dfrac{1}{2x^3 - 4x + 5}(6x^2 - 4)$

$f(x)' = \dfrac{6x^2 - 4}{2x^3 - 4x + 5}$

12: $f(x) = x\ln(x^2+1)$

$y = \ln(x^2+1)$

$y' = \dfrac{1}{x^2+1} \cdot 2x^{2-1}$

$y' = \dfrac{1}{x^2+1} \cdot 2x = \dfrac{2x}{x^2+1}$

$f(x)' = (x)'(\ln(x^2+1)) + (x)\left(\dfrac{2x}{x^2+1}\right)$

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

13: $f(x) = (\ln 2x + \ln(x))$

$f(x)' = \frac{1}{2x + \ln(x)} \cdot (2x + \ln(x))$ $\rightarrow (2 + \frac{1}{x})$

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

14: $f(x) = (\ln(x))^2$

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

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

$f(x)' = \frac{2\ln(x)}{x}$

15: $f(x) = \ln\frac{2x+1}{3x+4}$

$u = \frac{2x+1}{3x+4}$

$f(x)' = \frac{(2x^{1-1} + 0)(3x+4) - (2x+1)(3x^{1-1} + 0)}{(3x+4)^2} \cdot \frac{1}{\frac{2x+1}{3x+4}}$

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

$f(x)' = \frac{(6x+8) - (6x^2 - 3x)}{(3x+4)^2} \cdot \frac{1}{\frac{2x+1}{3x+4}}$