C12 - 2.6 - Chain Rule Derivatives Notes

$y = (2x+1)^3$ Chain Rule

$y' = 3(2x+1)^{3-1} \times 2$

$y' = 6(2x+1)^2$

Inside

$y = 2x + 1$

$y' = 2$

$y = x^3$ Chain Rule

$\frac{dy}{dx} = 3x^2 \times \frac{dx}{dx}$

$\frac{dy}{dx} = 3x^2 \times 1$

$y = (2x+1)^3$ FOIL

$y = 8x^3 + 12x^2 + 6x + 1$

$y' = 24x^2 + 24x + 6$

$y' = 6(4x^2 + 4x + 1)$

$y' = 6(2x+1)^2$

$y = (x^2 + 2x)^5$

$y' = 5(x^2 + 2x)^4(2x + 2)$

$y' = 10(x^2 + 2x)^4(x + 1)$ GCF

$y = x^2 + 2x$

$y' = 2x + 2$

$y = that^{\#}$

$y' = \#that^{\#-1} \times (chain\ that)$

$y = \sqrt{3x}$

$y = (3x)^{\frac{1}{2}}$

$y' = \frac{1}{2}(3x)^{-\frac{1}{2}} \times 3$

$y' = \frac{3}{2(3x)^{\frac{1}{2}}}$

$y' = \frac{3}{2\sqrt{3x}}$

$y = 3x$

$y' = 3$

$y = \sqrt{that}$

$y' = \frac{chain\ that}{2\sqrt{that}}$

$y = x^3(2x-5)^4$

$y' = 3x^2(2x-5)^4 + 4(2x-5)^3(2)(x^3)$

$y' = 3x^2(2x-5)^4 + 8x^3(2x-5)^3)$

$y' = x^2(2x-5)^3(3(2x-5) + 8x)$

$y' = x^2(2x-5)^3(14x-5)$

$u = x^3$

$u' = 3x^2$

$v = (2x-5)^4$

$v' = 4(2x-5)^3(2)$

$y = \frac{x}{\sqrt{2x+3}}$

$u = x$

$u' = 1$

$v = \sqrt{2x+3}$

$v' = \frac{2}{\sqrt{2x+3}}$

$y' = \frac{1(\sqrt{2x+3}) + \frac{2}{\sqrt{2x+3}}}{2x+3} \begin{matrix} \times LCD \\ \times LCD \end{matrix}$

$y' = \frac{2x+3+2}{(2x+3)^{\frac{3}{2}}} = \frac{2x+5}{(2x+3)^{\frac{3}{2}}}$

$y = \left(\frac{x+5}{2x-1}\right)^3$

$y' = 3\left(\frac{x+5}{2x-1}\right)^2\left(\frac{1(2x-1) - 2(x+5)}{(2x-1)^2}\right)$

$y' = 3\left(\frac{x+5}{2x-1}\right)^2\left(\frac{-8}{(2x-1)^2}\right)$

$y' = \frac{-24(x+5)^2}{(2x-1)^4}$

Inside

$y = (2x + (x^2+1)^2)^3$

$y' = 3(2x + (x^2+1)^2)^2(2 + 2(x^2+1)^1(2x))$

$y' = 3(2x + (x^2+1)^2)^2(4x^3 + 4x + 2)$

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

$y' = 2 + 2(x^2+1)^1(2x)$