ICM: Challenging Chain Rule Practice

Ex: $y = \dfrac{x-3}{\sqrt[4]{x^5+3}}$ high / low

* Quotient Rule which includes chain rule *

D High : 1

D low : $\frac{1}{4}(x^5+3)^{-3/4}(5x^4) = \dfrac{5x^4}{4\sqrt[4]{(x^5+3)^3}}$ Chain Rule!

Now do Quotient Rule regularly:

$$\frac{\sqrt[4]{x^5+3}(1) - (x-3)\left(\dfrac{5x^4}{4\sqrt[4]{(x^5+3)^3}}\right)}{\left(\sqrt[4]{x^5+3}\right)^2}$$

Ex: $(-5x^2-2)(\sqrt[5]{-3x+2})$ (1 / 2)

* Product Rule which includes chain rule *

D 1 : $-10x$

D 2 : $(-3x+2)^{1/5}$

in: $-3x+2$ out: $\sqrt[5]{x}$ or $x^{1/5}$

d·in: -3 d·out: $\frac{1}{5}x^{-4/5}$

$$\frac{1}{5}(-3x+2)^{-4/5}(-3) = \frac{-3}{5\sqrt[5]{(-3x+2)^4}}$$

Now do product rule regularly:

$$(-5x^2-2)\left(\frac{-3}{5\sqrt[5]{(-3x+2)^4}}\right) + \left(\sqrt[5]{-3x+2}\right)(-10x)$$

EX. $y = \left(\frac{-x^2+2}{-5x^5-1}\right)^4$

chain rule which includes quotient rule

inside: $\frac{-x^2+2}{-5x^5-1}$ outside: x^4

$4x^3\left(\frac{-x^2+2}{-5x^5-1}\right)$(derivative of inside)

$4\left(\frac{-x^2+2}{-5x^5-1}\right)^3$(derivative of inside)

↳need quotient rule!

D inside: $\frac{(-5x^5-1)(-2x)-(-x^2+2)(-25x^4)}{(-5x^5-1)^2}$

Final Answer: $4\left(\frac{-x^2+2}{-5x^5-1}\right)^3\left(\frac{(-5x^5-1)(-2x)-(-x^2+2)(-25x^4)}{(-5x^5-1)^2}\right)$