

POP QUIZ

Differentiate the following functions:

1. $y = 0.75x^5 - \frac{4x^3}{3} + \frac{x}{\sqrt{\pi}}$ (power rule)

$$y' = 3.75x^4 + 4x^2 + \frac{1}{\sqrt{\pi}}$$

2. $y = \frac{1}{\sqrt{x^2 - 2x + 3}}$ (power rule, chain rule)

$$\begin{aligned} y &= (x^2 - 2x + 3)^{-1/2} \\ y' &= \frac{-1}{2}(x^2 - 2x + 3)^{-3/2}(2x - 2) \\ &= \frac{1 - x}{\sqrt{(x^2 - 2x + 3)^3}} \end{aligned}$$

3. $y = (3x^2 + 2)e^{-x}$ (product rule, power rule, chain rule, $(e^x)' = e^x$)

$$\begin{aligned} y' &= (3x^2 + 2)(-e^{-x}) + e^{-x}(6x) \\ &= e^x(-3x^2 + 6x - 2) \end{aligned}$$

4. $y = \ln(x - \sqrt[3]{x})$ ($(\ln x)' = 1/x$, chain rule, power rule)

$$\begin{aligned} y' &= \frac{1 - (1/3)x^{-2/3}}{x - \sqrt[3]{x}} \\ &= \frac{x^{2/3} - \frac{1}{3}}{x^{5/3} - x} \end{aligned}$$

5. $y = \frac{3x - 2}{2x + 5}$ (quotient rule)

$$\begin{aligned} y' &= \frac{(2x + 5)3 - (3x - 2)2}{(2x + 5)^2} \\ &= \frac{19}{(2x + 5)^2} \end{aligned}$$