Warm-ups: Power Rule & Derivatives

Example 1 $y = 2\sqrt{x} - 4x^{\frac{1}{3}} + \frac{3}{x^4} - \sqrt[4]{x}$

Step 1 $y' = 2\left(\frac{1}{2}\right)x^{\frac{1}{2}-1} - 4\left(\frac{1}{3}\right)x^{\frac{1}{3}-1} + 3(-4)x^{-4-1} - \frac{1}{4}x^{\frac{1}{4}-1}$

Step 2 $y' = x^{-\frac{1}{2}} - \frac{4}{3}x^{-\frac{2}{3}} - 12x^{-5} - \frac{1}{4}x^{-\frac{3}{4}}$

Step 3 $y' = \frac{1}{x^{1/2}} - \frac{4}{3x^{2/3}} - \frac{12}{x^5} - \frac{1}{4x^{3/4}}$ ✓

Step 4 $y' = \frac{1}{\sqrt{x}} - \frac{4}{3\sqrt[3]{x^2}} - \frac{12}{x^5} - \frac{1}{4\sqrt[4]{x^3}}$ { Looks like original equation if multiple choice asks for it }

* Professors Steps *

Step 1 $y = 2x^{\frac{1}{2}} - 4x^{\frac{1}{3}} + 3x^{-4} - x^{\frac{1}{4}}$

Step 2 $y' = 2*\frac{1}{2}x^{\frac{1}{2}-1} - 4*\frac{1}{3}x^{\frac{1}{3}-1} + 3(-4)x^{-4-1} - \frac{1}{4}x^{\frac{1}{4}-1}$

Step 3 $y' = x^{-\frac{1}{2}} - \frac{4}{3}x^{-\frac{2}{3}} - 12x^{-5} - \frac{1}{4}x^{-\frac{3}{4}}$

Step 4 $y' = \frac{1}{x^{\frac{1}{2}}} - \frac{4}{3x^{2/3}} - \frac{12}{x^5} - \frac{1}{4x^{3/4}}$ ✓

Example 2 $y = \frac{3}{4}x^{\frac{2}{3}} - \frac{5}{2}x^{\frac{7}{2}} + \frac{1}{3x^6} + \sqrt[5]{x} = 3x^{\frac{1}{5}}$ same as $\sqrt[5]{x}$

Step 1 $y' = \frac{3}{4}\left(\frac{2}{3}\right)x^{\frac{2}{3}-1} - \frac{5}{2}\left(\frac{7}{2}\right)x^{\frac{7}{2}-1} + \frac{1}{3}(-6)x^{-6-1} + 3\left(\frac{1}{5}\right)x^{\frac{1}{5}-1}$

Step 2 $y' = \frac{1}{2}x^{-\frac{1}{3}} - \frac{35}{4}x^{\frac{5}{2}} + (-2)x^{-7} + \frac{3}{5}x^{-\frac{4}{5}}$

Step 3 $y' = \frac{1}{2x^{\frac{1}{3}}} - \frac{35x^{\frac{5}{2}}}{4} - \frac{2}{x^7} + \frac{3}{5x^{\frac{4}{5}}}$

Professors Steps

Step 1 $y = \frac{3}{4}x^{\frac{2}{3}} - \frac{5}{2}x^{\frac{7}{2}} + \frac{1}{3}x^{-6} + 3x^{\frac{1}{5}}$

Step 2 $y' = \frac{3}{4}\left(\frac{2}{3}\right)x^{\frac{2}{3}-1} - \frac{5}{2}\left(\frac{7}{2}\right)x^{\frac{7}{2}-1} + \frac{1}{3}(-6)x^{-6-1} + 3\left(\frac{1}{5}\right)x^{\frac{1}{5}-1}$

Step 3 $y' = \frac{1}{2}x^{-\frac{1}{3}} - \frac{35}{4}x^{\frac{5}{2}} - 2x^{-7} + \frac{3}{5}x^{-\frac{4}{5}}$

Step 4 $y' = \frac{1}{2x^{1/3}} - \frac{35}{4}x^{5/2} - \frac{2}{x^7} + \frac{3}{5x^{4/5}}$