

# Mathematics Step by Step

Show  $[x^n]' = nx^{n-1}$  by using first principles.

$$\begin{aligned} f'(x) &= \lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} \\ &= \lim_{\Delta x \rightarrow 0} \frac{(x + \Delta x)^n - (x)^n}{\Delta x} \end{aligned}$$