Additional Q

Using product rule & known derivative of function $f(x)=\frac{1}{x}$, $f'(x)=-\frac{1}{x^2}$.

Use these to derive derivatives for the functions such as $g(x)=\frac{1}{x^2}$, $h(x)=\frac{1}{x^3}$, ...

tinyurl.com/apexcalculus

Derive the power rule using product rule and the result if $f(x)=x$, $f'(x)=1$.

$$f(x) = g(x)\,h(x)\,l(x)$$

$$f'(x) = g'(x)\,h(x)\,l(x) + g(x)\big(h'(x)\,l(x) + h(x)\,l'(x)\big)$$

$$= g'(x)\,h(x)\,l(x) + g(x)\,h'(x)\,l(x) + g(x)\,h(x)\,l'(x)$$

Eg. If $\boxed{g(x) = \frac{1}{x^2}}$

$= \frac{1}{x} \cdot \frac{1}{x}$

Apply the product rule to get

$$\boxed{g'(x) = \left(\frac{1}{x}\right)' \cdot \frac{1}{x} + \left(\frac{1}{x}\right)\left(\frac{1}{x}\right)'}$$

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

$$= -\frac{1}{x^3} - \frac{1}{x^3}$$

$$= \boxed{\frac{-2}{x^3}}$$

For $h(x) = \frac{1}{x^3}$

$= \frac{1}{x^2} \cdot \frac{1}{x}$

Similarly for regular product rule.

using $f(x) = x$, $f'(x) = 1$.

$\boxed{g(x) = x^2} = x \cdot x$

$\boxed{g'(x) = 1 \cdot x + x \cdot 1 = 2x.}$