

DERIVATIVE RULES

Let $f(x)$, $g(x)$ be functions. Assume that $f'(x)$ and $g'(x)$ both exist.

LINEARITY

- $\frac{d}{dx} (f(x) \pm g(x)) = f'(x) \pm g'(x)$
- $\frac{d}{dx} (kf(x)) = kf'(x)$, for any constant k .

POWER RULE

- $\frac{d}{dx} x^r = rx^{r-1}$, for any real number r .

PRODUCT RULE

- $\frac{d}{dx} (f(x)g(x)) = f'(x)g(x) + f(x)g'(x)$

$$(uv)' = u'v + uv'$$

QUOTIENT RULE

- $\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$.

$$\left(\frac{u}{v} \right)' = \frac{u'v - uv'}{v^2}$$