The Product Rule

Basic Properties and Formulas

If $f(x)$ and $g(x)$ are differentiable functions (the derivative exists), c and n are any real numbers,

1. $\frac{d}{dx}\left(c\right) = 0$
2. $\left(c\,f(x)\right)' = c\,f'(x)$
3. $\frac{d}{dx}\left(x^n\right) = n\,x^{n-1}$ – **Power Rule**
4. $\left(f(x) \pm g(x)\right)' = f'(x) \pm g'(x)$
5. $\left(f(x)\,g(x)\right)' = f'(x)\,g(x) + f(x)\,g'(x)$ **Product Rule**
6. $\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x)\,g(x) - f(x)\,g'(x)}{\left(g(x)\right)^2}$ – **Quotient Rule**
7. $\frac{d}{dx}\left(f\left(g(x)\right)\right) = f'\left(g(x)\right)\,g'(x)$ – **Chain Rule**