

*Some useful Calculus Formulas*

*Derivative Formula:*

$$\frac{d}{dx}f(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

*Tangent line slope at point X = a:*

$$\hat{f}(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

$$\hat{f}(a) = \lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$$

*Multi-factor derivative, Product Rule:*

$$y = uv$$

$$y' = u'v + v'u$$

$$y = u.v.w$$

$$y' = u'vw + v'u w + w'u v$$

*Quotient rule:*

$$y = \frac{u}{v}$$

$$y' = \frac{u'v - v'u}{v^2}$$

*Composite Function, Chain Rule:*

$$y = f \circ g \circ h(x)$$

$$y' = f'g'h'$$

*Tangent Line formula at a given point (a, f(a)):*

$$y = f'(a)(x - a) + f(a)$$

*Absolute Value:*

$$|u| = \sqrt{u^2}$$

$$\frac{d}{dx}|u| = \frac{d}{dx}\sqrt{u^2} \quad \text{or}$$

$$\frac{d}{dx}|u| = \frac{2u}{2\sqrt{u^2}} = \frac{u}{|u|}$$

*Inverse Function:*

$$\frac{d}{dx}(f^{-1}(x)) = \frac{1}{\frac{d}{dx}f(f^{-1}(x))}$$

or

$$(f^{-1}(x))' = \frac{1}{f'(f^{-1}(x))}$$