# Mathematics 31 – Derivative Rules

| Name of Rule | Rule |
|---|---|
| **Power Rule** | If $y = x^n$, then $y' = nx^{n-1}$<br>or<br>If $y = x^n$, then $\frac{dy}{dx} = nx^{n-1}$. |
| **Constant Multiple Rule** | For $g(x) = cf(x)$, $g'(x) = cf'(x)$<br>or<br>$\frac{d}{dx}[cf(x)] = c\frac{d}{dx}f(x)$ |
| **Constant Rule** | For $g(x) = c$, $g'(x) = 0$ |
| **Sum Rule** | $[f(x) + g(x)]' = f'(x) + g'(x)$<br>or<br>$\frac{d}{dx}[f(x) + g(x)] = \frac{d}{dx}f(x) + \frac{d}{dx}g(x)$ |
| **Difference Rule** | $[f(x) - g(x)]' = f'(x) - g'(x)$<br>or<br>$\frac{d}{dx}[f(x) - g(x)] = \frac{d}{dx}f(x) - \frac{d}{dx}g(x)$ |
| **Product Rule** | $(fg)'\ x = f(x)g'(x) + f'(x)g(x)$<br>or<br>$\frac{d}{dx}[f(x) \cdot g(x)] = f(x) \cdot \frac{d}{dx}[g(x)] + \frac{d}{dx}[f(x)] \cdot g(x)$ |
| **Quotient Rule** | $\left(\frac{f}{g}\right)'\ x = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$<br>or<br>$\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x) \cdot \frac{d}{dx}[f(x)] - f(x) \cdot \frac{d}{dx}[g(x)]}{[g(x)]^2}$ |
| **Chain Rule** | $\frac{d}{dx}f(g(x)) = f'(g(x)) \cdot g'(x)$<br>or<br>$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$ |

# Mathematics 31 – Trigonometric Derivatives

$$\frac{d}{dx}\sin x = \cos x \qquad \frac{d}{dx}\csc x = -\csc x \cot x$$

$$\frac{d}{dx}\cos x = -\sin x \qquad \frac{d}{dx}\sec x = \sec x \tan x$$

$$\frac{d}{dx}\tan x = \sec^2 x \qquad \frac{d}{dx}\cot x = -\csc^2 x$$

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