Basic Derivatives

$$\frac{d}{dx}e^{f(x)} = \qquad f'(x)e^{f(x)}$$

$$\frac{d}{dx}\sin f(x) = \qquad \cos f(x) \cdot f'(x)$$

$$\frac{d}{dx}\cos f(x) = \qquad -\sin f(x) \cdot f'(x)$$

$$\frac{d}{dx}\tan f(x) = \qquad \sec^2 f(x) \cdot f'(x)$$

$$\frac{d}{dx}\cot f(x) = \qquad -\csc^2 f(x) \cdot f'(x)$$

$$\frac{d}{dx}\sec f(x) = \qquad \sec f(x)\tan f(x) \cdot f'(x)$$

$$\frac{d}{dx}\csc f(x) = \qquad -\csc f(x)\cot f(x) \cdot f'(x)$$

$$\frac{d}{dx}\ln f(x) = \qquad \frac{f'(x)}{f(x)}$$

$$\frac{d}{dx}\log_a f(x) = \qquad \frac{f'(x)}{f(x)\ln a}$$

$$\frac{d}{dx}(f(x))^n = \qquad n\,(f(x))^{n-1}\,f'(x)$$

$$\frac{d}{dx}\sqrt{f(x)} = \qquad \frac{f'(x)}{2\sqrt{f(x)}}$$

$$\frac{d}{dx}a^x = \qquad a^x \ln a$$

$$\frac{d}{dx}b^{g(x)} = \qquad b^{g(x)} \ln b \cdot g'(x)$$

Chain Rule

$$\frac{d}{dx}f(g(x)) = \qquad f'(g(x)) \cdot g'(x)$$

Higher-Order Derivatives

$$\frac{d^2}{dx^2}e^x = \qquad e^x$$

$$\frac{d^3}{dx^3}\sin x = \qquad -\cos x$$

$$\frac{d^4}{dx^4}\cos x = \qquad \cos x$$

Inverse Trigonometric

$$\frac{d}{dx}\arcsin f(x) = \qquad \frac{f'(x)}{\sqrt{1-(f(x))^2}}$$

$$\frac{d}{dx}\arccos f(x) = \qquad -\frac{f'(x)}{\sqrt{1-(f(x))^2}}$$

$$\frac{d}{dx}\arctan f(x) = \qquad \frac{f'(x)}{1+(f(x))^2}$$

$$\frac{d}{dx}\mathrm{arccot}\, f(x) = \qquad -\frac{f'(x)}{1+(f(x))^2}$$

$$\frac{d}{dx}\mathrm{arcsec}\, f(x) = \qquad \frac{f'(x)}{|f(x)|\sqrt{(f(x))^2-1}}$$

$$\frac{d}{dx}\mathrm{arccsc}\, f(x) = \qquad -\frac{f'(x)}{|f(x)|\sqrt{(f(x))^2-1}}$$

Hyperbolic Function

$$\frac{d}{dx}\sinh f(x) = \qquad \cosh f(x) \cdot f'(x)$$

$$\frac{d}{dx}\cosh f(x) = \qquad \sinh f(x) \cdot f'(x)$$

$$\frac{d}{dx}\tanh f(x) = \qquad \mathrm{sech}^2 f(x) \cdot f'(x)$$

$$\frac{d}{dx}\coth f(x) = \qquad -\mathrm{csch}^2 f(x) \cdot f'(x)$$

$$\frac{d}{dx}\mathrm{sech}\, f(x) = \qquad -\mathrm{sech}\, f(x)\tanh f(x) \cdot f'(x)$$

$$\frac{d}{dx}\mathrm{csch}\, f(x) = \qquad -\mathrm{csch}\, f(x)\coth f(x) \cdot f'(x)$$

Product and Quotient

$$\frac{d}{dx}[u \cdot v] = \qquad u' \cdot v + u \cdot v'$$

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \qquad \frac{u' \cdot v - u \cdot v'}{v^2}$$

θ	Radians	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$
0°	0	0	1	0
30°	$\pi/6$	$1/2$	$\sqrt{3}/2$	$\sqrt{3}/3$
45°	$\pi/4$	$\sqrt{2}/2$	$\sqrt{2}/2$	1
60°	$\pi/3$	$\sqrt{3}/2$	$1/2$	$\sqrt{3}$
90°	$\pi/2$	1	0	$-$
180°	π	0	-1	0
270°	$3\pi/2$	-1	0	$-$
360°	2π	0	1	0

Table 1: Important Trigonometric Angles