AP CALCULUS AB

DERIVATIVES OF THE BASIC FUNCTIONS

$$\frac{d}{dx}[\,x^p\,] = px^{p-1}$$

$$\frac{d}{dx}[\,|x|\,] = \frac{x}{|x|}, \quad x \neq 0$$

$$\frac{d}{dx}[\,\sin x\,] = \cos x$$

$$\frac{d}{dx}[\,\cos x\,] = -\sin x$$

$$\frac{d}{dx}[\,\tan x\,] = \sec^2 x$$

$$\frac{d}{dx}[\,\cot x\,] = -\csc^2 x$$

$$\frac{d}{dx}[\,\sec x\,] = \sec x \tan x$$

$$\frac{d}{dx}[\,\csc x\,] = -\csc x \cot x$$

Note: all the inverse trigonometric functions are the principal branches.

$$\frac{d}{dx}[\,\sin^{-1} x\,] = \frac{1}{\sqrt{1-x^2}}, \quad -1 < x < 1$$

$$\frac{d}{dx}[\,\cos^{-1} x\,] = \frac{-1}{\sqrt{1-x^2}}, \quad -1 < x < 1$$

$$\frac{d}{dx}[\,\tan^{-1} x\,] = \frac{1}{1+x^2}$$

$$\frac{d}{dx}[\,\cot^{-1} x\,] = \frac{-1}{1+x^2}$$

$$\frac{d}{dx}[\,\sec^{-1} x\,] = \frac{1}{|x|\sqrt{x^2-1}},$$

$$-\infty < x < -1 \text{ or } 1 < x < \infty$$

$$\frac{d}{dx}[\,\csc^{-1} x\,] = \frac{-1}{|x|\sqrt{x^2-1}},$$

$$-\infty < x < -1 \text{ or } 1 < x < \infty$$

$$\frac{d}{dx}[\,e^x\,] = e^x$$

$$\frac{d}{dx}[\,b^x\,] = (\ln b)b^x$$

$$\frac{d}{dx}[\,\ln|x|\,] = \frac{1}{|x|}\cdot\frac{x}{|x|} = \frac{x}{x^2} = \frac{1}{x}, \quad x \neq 0$$

$$\frac{d}{dx}[\,\ln x\,] = \frac{1}{x}, \quad x > 0$$

$$\frac{d}{dx}[\,\log_b|x|\,] = \frac{1}{(\ln b)x}, \quad x \neq 0$$

$$\frac{d}{dx}[\,\log_b x\,] = \frac{1}{(\ln b)x}, \quad x > 0$$