Derivatives of Exponential and Logarithmic Functions

Let a be a positive real number ($a \neq 1$) and let u be a differentiable function of x.

$$\frac{d}{dx}[a^x] = (\ln a)a^x \qquad \frac{d}{dx}[a^u] = (\ln a)a^u \cdot u'$$

Differentiate the following functions

$$f(x) = 5^x \qquad\qquad f(x) = 4^{2x+1}$$

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$$\frac{d}{dx}[a^x] = (\ln a)a^x \qquad \frac{d}{dx}[a^u] = (\ln a)a^u \cdot u'$$

Differentiate the following functions

$$f(x) = x(3^{4x}) \qquad\qquad f(x) = \frac{4^{3x}}{x^2}$$

Let a be a positive real number $(a \neq 1)$ and let u be a differentiable function of x.

$$\frac{d}{dx}[\log_a x] = \frac{1}{(\ln a)x} \qquad \frac{d}{dx}[\log_a u] = \frac{1}{(\ln a)u} \cdot u'$$

Differentiate the following functions

$$f(x) = \log_5 x \qquad\qquad f(x) = \log_3(x^2 + 2)$$

Let a be a positive real number $(a \neq 1)$ and let u be a differentiable function of x.

$$\frac{d}{dx}[\log_a x] = \frac{1}{(\ln a)x} \qquad \frac{d}{dx}[\log_a u] = \frac{1}{(\ln a)u} \cdot u'$$

Differentiate the following functions

$$f(x) = x^2(\log_7 5x)$$

Let a be a positive real number ($a \neq 1$) and let u be a differentiable function of x.

$$\frac{d}{dx}[\log_a x] = \frac{1}{(\ln a)x} \qquad \frac{d}{dx}[\log_a u] = \frac{1}{(\ln a)u} \cdot u'$$

Differentiate the following functions

$$f(x) = \frac{\log_2 x}{x}$$

Let a be a positive real number ($a \neq 1$) and let u be a differentiable function of x.

$$\frac{d}{dx}[a^x] = (\ln a)a^x \qquad \frac{d}{dx}[a^u] = (\ln a)a^u \cdot u'$$

$$\frac{d}{dx}[\log_a x] = \frac{1}{(\ln a)x} \qquad \frac{d}{dx}[\log_a u] = \frac{1}{(\ln a)u} \cdot u'$$

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