DIFFERENTIATION RULES

Let α, b, k, and r be constants, with $b > 0$, $b \neq 1$, and , $f, g : \mathbb{R} \to \mathbb{R}$ differentiable functions. Then:

Terminal rules

Rules of differentiation that **resolve** a derivative in a form that does not require further differentiation.

(1) $\frac{d}{dx}\{k\} =$

(2) $\frac{d}{dx}\{x^{\alpha}\} =$

- $\frac{d}{dx}\{x\} =$
- $\frac{d}{dx}\left\{\frac{1}{x^{\alpha}}\right\} =$

(3) $\frac{d}{dt}\{e^{rt}\} =$

- $\frac{d}{dx}\{b^{x}\} =$

(4) $\frac{d}{dx}\{\sin x\} =$

(5) $\frac{d}{dx}\{\cos x\} =$

(6) $\frac{d}{dx}\{\tan x\} =$

(7) $\frac{d}{dx}\{\arcsin x\} =$

(8) $\frac{d}{dx}\{\arccos x\} =$

(9) $\frac{d}{dx}\{\arctan x\} =$

(10) $\frac{d}{dx}\{\ln x\} =$

- $\frac{d}{dx}\{\log_b x\} =$

Nonterminal rules

Rules of differentiation that expresses a derivative of a function in terms of derivatives of **simpler** functions.

(11) $\frac{d}{dx}\{k \cdot f(x)\} =$

(12) $\frac{d}{dx}\{f(x) \pm g(x)\} =$

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

(14) $\frac{d}{dx}\left\{\frac{f(x)}{g(x)}\right\} =$

- $\frac{d}{dx}\left\{\frac{k}{g(x)}\right\} =$
- $\frac{d}{dx}\left\{\frac{f(x)}{k}\right\} =$

(15) $\frac{d}{dx}\{f(g(x))\} =$

(16) $\frac{d}{dy}\left\{f^{-1}(y)\right\} =$

Date: Winter 2017.