1 Производные

$$\left(\frac{1}{x}\right)' = -\frac{1}{x^2} \qquad \left(\frac{1}{x^n}\right)' = -\frac{n}{x^{n+1}} \qquad (\sqrt{x})' = \frac{1}{2\sqrt{x}} \qquad (\sqrt[n]{x})' = \frac{1}{n\sqrt[n]{x^{n-1}}}$$

$$(a^x)' = a^x \ln a \qquad (10^x)' = 10^x \ln 10 \qquad (x^x)' = x^x(1 + \ln x)$$

$$(\ln x)' = \frac{1}{x} \qquad (\lg x)' = \frac{1}{x \ln 10} \qquad (\log_a x)' = \frac{1}{x \ln a}$$

$$\sin x' = \cos x \qquad \cos x' = -\sin x \qquad \operatorname{tg} x' = \frac{1}{\cos^2 x} \qquad \operatorname{ctg} x' = -\frac{1}{\sin^2 x}$$

$$\arcsin x' = \frac{1}{\sqrt{1-x^2}} \qquad \arccos x' = -\frac{1}{\sqrt{1-x^2}} \qquad \operatorname{arctg} x' = \frac{1}{1+x^2} \qquad \operatorname{arcctg} x' = -\frac{1}{1+x^2}$$

$$\operatorname{arsh} x' = \frac{1}{\sqrt{1+x^2}} \qquad \operatorname{arch} x' = \frac{1}{\sqrt{x^2-1}} \qquad \operatorname{arth} x' = \frac{1}{1-x^2} \qquad \operatorname{arcth} x' = \frac{1}{x^2-1}$$

$$\operatorname{th} x' = \frac{1}{\operatorname{ch}^2 x} \qquad \operatorname{cth} x' = -\frac{1}{\operatorname{sh}^2 x}$$

$$y = f(x) \quad x = g(y) \quad g = f^{-1} \qquad \Rightarrow \qquad g'(y) = \frac{1}{f'(x)} \qquad (f(g(x)))' = f'(t)g'(x)$$

$$(a \cdot b)' = a'b + ab' \qquad \left(\frac{a}{b}\right)' = \frac{a'b - ab'}{b^2} \qquad (a \cdot b)^{(n)} = \sum_{k=0}^{n} C_n^k a^{(k)} b^{(n-k)}$$

$$(x^m)^{(n)} = \begin{cases} m(m-1)\cdots(m-n+1)x^{m-n}, & n \leqslant m \\ 0, & n > 0 \end{cases}$$

$$(a^{kx})^{(n)} = (k \ln a)^n a^{kx} \qquad (\log_a x)^{(n)} = (-1)^{n-1}(n-1)!\tfrac{1}{\ln a \cdot x^{n-1}}$$

$$(\sin kx)^{(n)} = k^n \sin(x + n\pi/2) \qquad (\cos kx)^{(n)} = k^n \cos(x + n\pi/2)$$

$$(\operatorname{sh} x)^{(n)} = \begin{cases} shx, & n = 2k \\ chx, & n = 2k+1 \end{cases} \qquad (\operatorname{ch} x)^{(n)} = \begin{cases} chx, & n = 2k \\ shx, & n = 2k+1 \end{cases}$$