Таблица производных основных элементарных функций

$$(x^{\alpha})' = \alpha x^{\alpha-1}$$

$$(C)' = 0, \ (C = const)$$

$$(x)' = 1$$

$$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$$

$$\left(\frac{1}{x}\right)' = -\frac{1}{x^2}$$

$$(a^x)' = a^x \ln a$$

$$(e^x)' = e^x$$

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

$$(\ln x)' = \frac{1}{x}$$

$$(\sin x)' = \cos x$$

$$(\cos x)' = -\sin x$$

$$(tg\, x)' = \frac{1}{\cos^2 x}$$

$$(ctg\, x)' = -\frac{1}{\sin^2 x}$$

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

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

$$(arctg\, x)' = \frac{1}{1+x^2}$$

$$(arcctg\, x)' = -\frac{1}{1+x^2}$$

Таблица дифференциалов основных элементарных функций

$$dx = \frac{1}{a}\,d(ax+b)$$

$$\sin x\,dx = -d\cos x$$

$$\cos x\,dx = d\sin x$$

$$x^{\alpha}dx = \frac{1}{\alpha+1}\,dx^{\alpha+1} \quad (\alpha \neq -1)$$

$$\frac{dx}{\cos^2 x} = d\,tg\,x$$

$$x\,dx = \frac{1}{2}\,dx^2$$

$$\frac{dx}{\sin^2 x} = -d\,ctg\,x$$

$$\frac{dx}{\sqrt{x}} = 2\,d\sqrt{x}$$

$$\frac{dx}{x^2} = -d\,\frac{1}{x}$$

$$\frac{dx}{\sqrt{1-x^2}} = d\arcsin x = -d\arccos x$$

$$a^x dx = \frac{da^x}{\ln a}$$

$$\frac{dx}{1+x^2} = d\,arctg\,x = -d\,arcctg\,x$$

$$e^x dx = de^x$$

$$\frac{dx}{x} = d\ln|x| = (\ln a)\,d\log_a|x|$$

Таблица неопределенных интегралов от основных элементарных функций

$$\int 0\,du = C$$

$$\int u^{\alpha} du = \frac{u^{\alpha+1}}{\alpha+1} + C \quad (\alpha \neq -1)$$

$$\int du = u + C$$

$$\int \frac{du}{\sqrt{u}} = 2\sqrt{u} + C$$

$$\int \frac{du}{u^2} = -\frac{1}{u} + C$$

$$\int a^u du = \frac{a^u}{\ln a} + C$$

$$\int e^u du = e^u + C$$

$$\int \frac{du}{u} = \ln|u| + C = (\ln a)\log_a|u| + C$$

$$\int \sin u\,du = -\cos u + C$$

$$\int \cos u\,du = \sin u + C$$

$$\int \frac{du}{\cos^2 u} = tg\,u + C$$

$$\int \frac{du}{\sin^2 u} = -ctg\,u + C$$

$$\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin\frac{u}{a} + C = -\arccos\frac{u}{a} + C$$

$$\int \frac{du}{a^2 + u^2} = \frac{1}{a}\,arctg\frac{u}{a} + C = -\frac{1}{a}\,arcctg\frac{u}{a} + C$$

Некоторые полезные интегралы:

$$\int \frac{du}{a^2 - u^2} = \frac{1}{2a} ln\left|\frac{u+a}{u-a}\right| + C$$ (высокий логарифм)

$$\int \frac{du}{\sqrt{u^2 \pm a^2}} = ln\left|u + \sqrt{u^2 \pm a^2}\right| + C$$ (длинный логарифм)

$$\int \sqrt{a^2 - u^2}\, du = \frac{u}{2}\sqrt{a^2 - u^2} + \frac{a^2}{2} arcsin\frac{u}{a} + C$$

$$\int \sqrt{u^2 \pm a^2}\, du = \frac{u}{2}\sqrt{u^2 \pm a^2} \pm \frac{a^2}{2} ln\left|u + \sqrt{u^2 \pm a^2}\right| + C$$