*Таблица интегралов*

1) $\int x^a dx = \frac{x^{a+1}}{a+1} + C, \quad a \neq -1;$

2) $\int \frac{dx}{x} = \ln|x| + C;$

3) $\int a^x dx = \frac{a^x}{\ln a} + C;$

4) $\int e^x dx = e^x + C;$

5) $\int \sin x dx = -\cos x + C;$

6) $\int \cos x dx = \sin x + C;$

7) $\int \frac{dx}{\cos^2 x} = tgx + C;$

8) $\int \frac{dx}{\sin^2 x} = -ctgx + C;$

9) $\int \frac{dx}{a^2 + x^2} = \frac{1}{a} arctg \frac{x}{a} + C;$

10) $\int \frac{dx}{1 + x^2} = arctgx + C;$

11) $\int \frac{dx}{\sqrt{a^2 - x^2}} = \arcsin \frac{x}{a} + C;$

12) $\int \frac{dx}{\sqrt{1 - x^2}} = \arcsin x + C;$

13) $\int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \ln \left| \frac{x-a}{x+a} \right| + C;$

14) $\int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln \left| x + \sqrt{x^2 \pm a^2} \right| + C;$

15) $\int chx\, dx = shx + C;$

16) $\int shx\, dx = chx + C;$

17) $\int \frac{dx}{ch^2 x} = thx + C;$

18) $\int \frac{dx}{sh^2 x} = -cthx + C, \quad x \neq 0.$

$$\int u(x)dv(x) = u(x)v(x) - \int v(x)du(x) \text{ или } \int udv = uv - \int vdu,$$

$$\int (2x+1)\cos 3x dx = \begin{bmatrix} u = 2x+1, & du = 2dx \\ dv = \cos 3x dx, & v = \frac{1}{3}\sin 3x \end{bmatrix}$$

$$\frac{P(x)}{Q(x)} = \frac{A_1}{(x-a)^k} + \frac{A_2}{(x-a)^{k-1}} + \text{L} + \frac{A_k}{x-a} + \frac{B}{x-b} +$$

$$+ \frac{Cx+D}{x^2+px+q} + \frac{E_1 x + F_1}{(x^2+px+q)^m} + \frac{E_2 x + F_2}{(x^2+px+q)^{m-1}} + \text{L} + \frac{E_m x + F_m}{x^2+px+q}$$

$$\frac{x^2+4}{x^3(x+1)^2} = \frac{A}{x^3} + \frac{B}{x^2} + \frac{C}{x} + \frac{D}{(x+1)^2} + \frac{E}{x+1} =$$

$$= \frac{\left(A + Bx + Cx^2\right)(x+1)^2 + \left(D + E(x+1)\right)x^3}{x^3(x+1)^2}.$$

$$\int_a^b f(x)dx = F(x)\Big|_a^b = F(b) - F(a) \quad \int_a^b f(x)dx = \int_\alpha^\beta f(\varphi(t))\varphi'(t)dt \quad \int_a^b u(x)dv(x) = u(x)v(x)\Big|_a^b - \int_a^b v(x)du(x)$$

$$\int_a^{+\infty} f(x)dx = \lim_{b \to +\infty} \int_a^b f(x)dx \quad \lim_{x \to b-\varepsilon} f(x) = \infty, \text{ то } \int_a^b f(x)dx = \lim_{\varepsilon \to 0} \int_a^{b-\varepsilon} f(x)dx$$

$$S = \int_a^b (f_1(x) - f_2(x))dx \qquad S = \int_a^b f(x)dx$$

$$z = a + bi \quad \text{и} \quad \bar{z} = a - bi$$

$$r = |z| = \sqrt{a^2 + b^2}$$

$$z = r(\cos\varphi + i\sin\varphi)$$

$$\cos\varphi = \frac{a}{r}, \ \sin\varphi = \frac{b}{r}, \ tg\varphi = \frac{a}{b}$$

$$\arg z = \begin{cases} arctg\frac{b}{a} \text{ для внутренних точек I и IV} \\ arctg\frac{b}{a} + \pi \text{ для внутренних точек II} \\ arctg\frac{b}{a} - \pi \text{ для внутренних точек III} \end{cases}$$

$$z_1 \cdot z_2 = r_1 r_2 \left(\cos(\varphi_1 + \varphi_2) + i\sin(\varphi_1 + \varphi_2)\right), \quad \frac{z_1}{z_2} = \frac{r_1}{r_2}\left(\cos(\varphi_1 - \varphi_2) + i\sin(\varphi_1 - \varphi_2)\right).$$

$$z^n = r^n (\cos n\varphi + i\sin n\varphi) \quad \sqrt[n]{z} = \sqrt[n]{r}\left(\cos\frac{\varphi + 2\pi k}{n} + i\sin\frac{\varphi + 2\pi k}{n}\right), \quad k = 0, 1, \ldots, n-1$$