Основные неопределённые интегралы:

1. $\int u^n \, du = \frac{u^{n+1}}{n+1} + C, \ (n \neq -1)$
2. $\int \frac{du}{u} = \ln|u| + C$
3. $\int a^u \, du = \frac{a^u}{\ln a} + C, \ (a > 0, \ a \neq 1);$
   $\int e^u \, du = e^u + C$
4. $\int \sin u \, du = -\cos u + C$
5. $\int \cos u \, du = \sin u + C$
6. $\int \frac{du}{\cos^2 u} = \operatorname{tg} u + C$
7. $\int \frac{du}{\sin^2 u} = -\operatorname{ctg} u + C$
8. $\int \frac{du}{\sin u} = \ln\left|\operatorname{tg}\frac{u}{2}\right| + C =$
   $= \ln|\operatorname{cosec} u - \operatorname{ctg} u| + C$
9. $\int \frac{du}{\cos u} = \ln\left|\operatorname{tg}\left(\frac{u}{2} + \frac{\pi}{4}\right)\right| + C =$
   $= \ln|\operatorname{tg} u + \sec u| + C$
10. $\int \frac{du}{u^2 + a^2} = \frac{1}{a}\operatorname{arctg}\frac{u}{a} + C, \ (a \neq 0)$
11. $\int \frac{du}{a^2 - u^2} = \frac{1}{2a}\ln\left|\frac{u+a}{u-a}\right| + C, \ (a \neq 0)$
12. $\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin\frac{u}{a} + C \ \ |u| < |a|$
13. $\int \frac{du}{\sqrt{u^2 - a^2}} = \ln\left|u + \sqrt{u^2 - a^2}\right| + C,$
    $|u| > |a| > 0$
14. $\int \frac{du}{\sqrt{u^2 + a^2}} = \ln\left(u + \sqrt{u^2 + a^2}\right) + C,$
    $(a \neq 0)$
15. $\int \operatorname{sh} u \, du = \operatorname{ch} u + C$
16. $\int \operatorname{ch} u du = shu + C$
17. $\int \frac{du}{\operatorname{ch}^2 u} = \operatorname{th} u + C$
18. $\int \frac{du}{\operatorname{sh}^2 u} = -\operatorname{cth} u + C$
19. $\int \frac{u \, du}{u^2 + a^2} = \frac{1}{2}\ln\left|u^2 + a^2\right| + C$
20. $\int \frac{u \, du}{a^2 - u^2} = -\frac{1}{2}\ln\left|a^2 - u^2\right| + C$
21. $\int \frac{u \, du}{\sqrt{a^2 + u^2}} = \sqrt{a^2 + u^2} + C$
22. $\int \frac{u \, du}{\sqrt{a^2 - u^2}} = -\sqrt{a^2 - u^2} + C$
23. $\int \sin(au) \ du = -\frac{1}{a}\cos(au) + C$
24. $\int \cos(au) \ du = \frac{1}{a}\sin(au) + C$
25. $\int e^{au} \, du = \frac{1}{a}e^{au} + C$

Свойства неопределённых интегралов:

- $\int f(x) \, dx = F(x) + C$
  $F'(x) = f(x)$
- $\left(\int f(x) \, dx\right)' = f(x)$
- $d\int f(x) \, dx = f(x) \, dx$
- $\int f'(x) \, dx = f(x) + C$
- $\int c \cdot f(x) \, dx = c \cdot \int f(x) \, dx$
- $\int (f(x) \pm g(x)) \ dx =$
  $= \int f(x) \, dx \pm \int g(x) \, dx$
- $\int f(u(t)) \, u'(t) \ dt = F(u(t)) + C$

Основные производные:

1. $C' = 0$
2. $x' = 1$
3. $(x^n)' = n \cdot x^{n-1}$
4. $\left(\sqrt{x}\right)' = \dfrac{1}{2\sqrt{x}}$
5. $(e^x)' = e^x$
6. $(a^x)' = a^x \ln a$
7. $(\ln x)' = \dfrac{1}{x}$
8. $(\log_a x)' = \dfrac{1}{x \ln a}$
9. $(\sin x)' = \cos x$
10. $(\cos x)' = -\sin x$
11. $(\operatorname{tg} x)' = \dfrac{1}{\cos^2 x}$
12. $(\operatorname{ctg} x)' = -\dfrac{1}{\sin^2 x}$
13. $(\arcsin x)' = \dfrac{1}{\sqrt{1-x^2}}$
14. $(\arccos x)' = -\dfrac{1}{\sqrt{1-x^2}}$
15. $(\operatorname{arctg} x)' = \dfrac{1}{1+x^2}$
16. $(\operatorname{arcctg} x)' = -\dfrac{1}{1+x^2}$
17. $(\operatorname{sh} x)' = \operatorname{ch} x$
18. $(\operatorname{ch} x)' = \operatorname{sh} x$
19. $(\operatorname{th} x)' = \dfrac{1}{\operatorname{ch}^2 x}$
20. $(\operatorname{cth} x)' = -\dfrac{1}{\operatorname{sh}^2 x}$
21. $(\operatorname{arcsh} x)' = \dfrac{1}{\sqrt{x^2+1}}$
22. $(\operatorname{arcch} x)' = \dfrac{1}{\sqrt{x^2-1}}$
23. $(\operatorname{arcth} x)' = \dfrac{1}{1-x^2}$
24. $(\operatorname{arccth} x)' = \dfrac{1}{1-x^2}$

Правила дифференцирования.

Если u и v - некие функции, зависящие от x, то

1. $(c \cdot u)' = c \cdot u'$
2. $(u+v)' = u' + g'$
3. $(u \cdot v)' = u' \cdot v + u \cdot v'$
4. $\left(\dfrac{u}{v}\right)' = \dfrac{u' \cdot v - u \cdot v'}{v^2}$
5. $(u(v))' = u'(v) \cdot v'$
6. Производная параметрически заданной функции: $y'_x = \dfrac{y'_t}{x'_t}$
7. Производная обратной функции: $g'_y(y) = \dfrac{1}{f'_x(x)}$