

23 Antiderivatives and Indefinite Integrals

Evaluate each indefinite integral.

1) $\int -3r^2 dr$ *power rule*

$-r^3 + C$

$\frac{-3r^{2+1}}{3}$

2) $\int (6t^5 + 6t^2 + 5) dt$ *power rule*

$t^6 + 2t^3 + 5t + C$

$\frac{6t^{5+1}}{6} + \frac{6t^{2+1}}{3} + 5t$

3) $\int 24t^5 dt$ *Power rule*

$4t^6 + C$

$\frac{24t^{5+1}}{6}$

4) $\int (12x^5 + 25x^4 + 2) dx$ *power rule*

$2x^6 + 5x^5 + 2x + C$

$\frac{12x^{5+1}}{6} + \frac{25x^{4+1}}{5} + 2x$

5) $\int 5x^4 dx$ *Power rule*

$x^5 + C$

$\frac{5x^{4+1}}{5}$

6) $\int 8s ds$ *Power rule*

$4s^2 + C$

$\frac{8s^{1+1}}{2}$

7) $\int \frac{2}{x} dx$

$2 \ln |x| + C$

$2 \int \frac{1}{x} dx$

In rule
 $\int \frac{1}{x} dx = \ln |x| + C$

Constant rule

$\int k \cdot f(x) dx = k \int f(x) dx$

8) $\int 5x^{-1} dx = \int \frac{5}{x} dx$ *In rule*

$5 \ln |x| + C$

9) $\int -\csc x \cdot \cot x \, dx$ *trig rule*

$\csc x + C$

10) $\int -4\sec x \cdot \tan x \, dx$

$-4\sec x + C$

11) $\int -2\cos x \, dx$

$-2\sin x + C$

12) $\int 4 \cdot \sec^2 x \, dx$

$4\tan x + C$

13) $\int \frac{1}{\sqrt{9-x^2}} \, dx$

$\sin^{-1} \frac{x}{3} + C$

$a^2=9$
 $a=3$
 $u^2=x^2$
 $u=x$

$\int \frac{1}{\sqrt{a^2-u^2}} \, du = \sin^{-1} \left(\frac{u}{a} \right) + C$

14) $\int \frac{1}{9+x^2} \, dx$

$\frac{1}{3} \cdot \tan^{-1} \frac{x}{3} + C$

$a^2=9$
 $a=3$
 $u^2=x^2$
 $u=x$

$\int \frac{1}{a^2+u^2} \, du = \frac{1}{a} \tan^{-1} \left(\frac{u}{a} \right) + C$

15) $\int \frac{1}{x\sqrt{x^2-1}} \, dx$

$\sec^{-1} |x| + C$

$\int \frac{1}{u\sqrt{u^2-a^2}} \, du = \frac{1}{a} \sec^{-1} \left(\frac{u}{a} \right) + C$

the || can be either location

16) $\int \frac{1}{\sqrt{1-x^2}} \, dx$

$\sin^{-1} x + C$