Antiderivatives

A function F is the antiderivative of f on an interval if F'(x) = f(x) for all x in the interval.

$$\frac{dy}{dx} \implies y = \text{some expression with } x$$

Names   Gen/Par   Notation

Other Names for an Antiderivative

Integral

Indefinite Integral

General Solution

Particular Solution

Antiderivatives

Notation

$$\int f(x)dx = F(x) + C$$

"The antiderivative of f with respect to x"

Basic Integration Rules

1. $\displaystyle\int 0\,dx = C$

2. $\displaystyle\int k\,dx = kx + C$

3. $\displaystyle\int kf(x)\,dx = k\int f(x)\,dx$

4. $\displaystyle\int [f(x) \pm g(x)]\,dx = \int f(x)\,dx \pm \int g(x)\,dx$

5. $\displaystyle\int x^n\,dx = \frac{x^{n+1}}{n+1} + C, n \neq -1$

6. $\displaystyle\int \cos x\,dx = \sin x + C$

7. $\displaystyle\int \sin x\,dx = -\cos x + C$

8. $\displaystyle\int \sec^2 x\,dx = \tan x + C$

9. $\displaystyle\int \sec x \tan x\,dx = \sec x + C$

10. $\displaystyle\int \csc^2 x\,dx = -\cot x + C$

11. $\displaystyle\int \csc x \cot x\,dx = -\csc x + C$

Find the antiderivative/indefinite integral

$$y' = 3$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$dy/dx = 2x^5$$

1
2
3
4
5
6
7 8 9

Find the antiderivative/indefinite integral

$$dy/dx = 5\sqrt{x}$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$\int \frac{2}{x^4}\, dx$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$\int 4x^3 + 6x^2 + 1\,dx$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$\int t^2 - \sin t \; dt$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$\int \sec p(\tan p - \sec p)\, dp$$

1

2

3

4

5

6

7 8 9

Find the antiderivative/indefinite integral

$$\int \frac{x^2 + x - 1}{x^4} \, dx$$

Find the antiderivative/indefinite integral

$$\int \frac{-\cos x}{\sin^2 x}\, dx$$

Solve the Differential
(find the particular solution given the initial condition

$$f\,'(s) = 6s - 8s^3; \; f(2) = 3$$

1
2

Solve the Differential
(find the particular solution given the initial condition)

$$f\,'(s) = \sin x; \ f(\pi) = 5$$