Rules of Integration

① $\int k \cdot f(x)\,dx = k\int f(x)\,dx$, where k is an arbitrary constant.

② $\int k\,dx = kx + C$, where k and C are arbitrary constants.

③ $\int x^k\,dx = \frac{x^{k+1}}{k+1} + C$ $(\text{for } k \neq -1)$, where k and C are arbitrary constants

④ $\int f(x) + g(x)\,dx = \int f(x)\,dx + \int g(x)\,dx$

⑤ $\int f(x) - g(x)\,dx = \int f(x)\,dx - g(x)\,dx$

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① $\int k \cdot f(x)\,dx = k\int f(x)\,dx$ $\int \rightarrow$ means antiderivative

$\int 4x\,dx = 4\int x\,dx$

The antiderivative of $4x$ = 4 times the antiderivative of x.

② $\int k\,dx = kx + C$

$\int 2\,dx = 2x + C$

An antiderivative of 2 with respect to x = $2x + C$, where C is a constant.

③ $\int x^k\,dx = \frac{x^{k+1}}{k+1} + C$

$\int x^{-3}\,dx = \frac{x^{-2}}{-2} + C$

④ $\int f(x) + g(x)\,dx = \int f(x)\,dx + \int g(x)\,dx$

$\int 2x + \sin(x)\,dx = \int 2x\,dx + \int \sin(x)\,dx$

The sum of an antiderivative of $2x$ and an antiderivative of $\sin(x)$ is also an antiderivative of $2x + \sin(x)$.