

## ***Factsheet:* Standard Integrals**

### **Basic rules**

$$\int f'(x) dx = f(x) + c$$

where  $f'(x)$  is the derivative of  $f(x)$  and  $c$  is the constant of integration

$$\int au dx = a \int u dx$$

where  $a$  is a constant and  $u$  is a function of  $x$

$$\int (u + v) dx = \int u dx + \int v dx$$

where  $u$  and  $v$  are functions of  $x$

$$\int_a^b f(x) dx = - \int_b^a f(x) dx$$

$$\int_a^c f(x) dx = \int_a^b f(x) dx + \int_b^c f(x) dx$$

$$\int_a^b f'(x) dx = f(b) - f(a)$$

Fundamental Theorem of Calculus

### **Integrals of power functions**

$$\int x^m dx = \frac{x^{m+1}}{m+1} + c$$

Power Rule of integration ( $m \neq -1$ )

$$\int \frac{dx}{x} = \int x^{-1} dx = \ln x + c$$

Power Rule of integration ( $m = -1$ )

$$\int dx = x + c$$

### **Integrals of logarithms and exponentials**

$$\int e^x dx = e^x + c$$

$$\int a^x dx = \frac{a^x}{\ln a} + c$$

$$\int \ln x dx = x \ln x - x + c$$

## Integrals of trigonometric functions

$$\int \sin x \, dx = -\cos x + c$$

$$\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1} \frac{x}{a} + c$$

$$\int \cos x \, dx = \sin x + c$$

$$\int \frac{dx}{a^2 + x^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + c$$

$$\int \tan x \, dx = \ln(\sec x) + c$$

$$\int \sec^2 x \, dx = \tan x + c$$

$$\int \csc^2 x \, dx = -\cot x + c$$

## Other useful formulas

$$\int u \frac{dv}{dx} \, dx = uv - \int v \frac{du}{dx} \, dx$$

Integration by parts

$$\int \frac{f'(x)}{f(x)} \, dx = \ln(f(x)) + c$$

where  $f'(x)$  is the derivative of  $f(x)$  with respect to  $x$

$$\int f'(x)(f(x))^n \, dx = \frac{(f(x))^{n+1}}{n+1} + c$$

$$\int f(u)u'(x) \, dx = \int f(u) \, du$$

where  $u'(x)$  is the derivative of  $u(x)$  with respect to  $x$

## Want to know more?

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