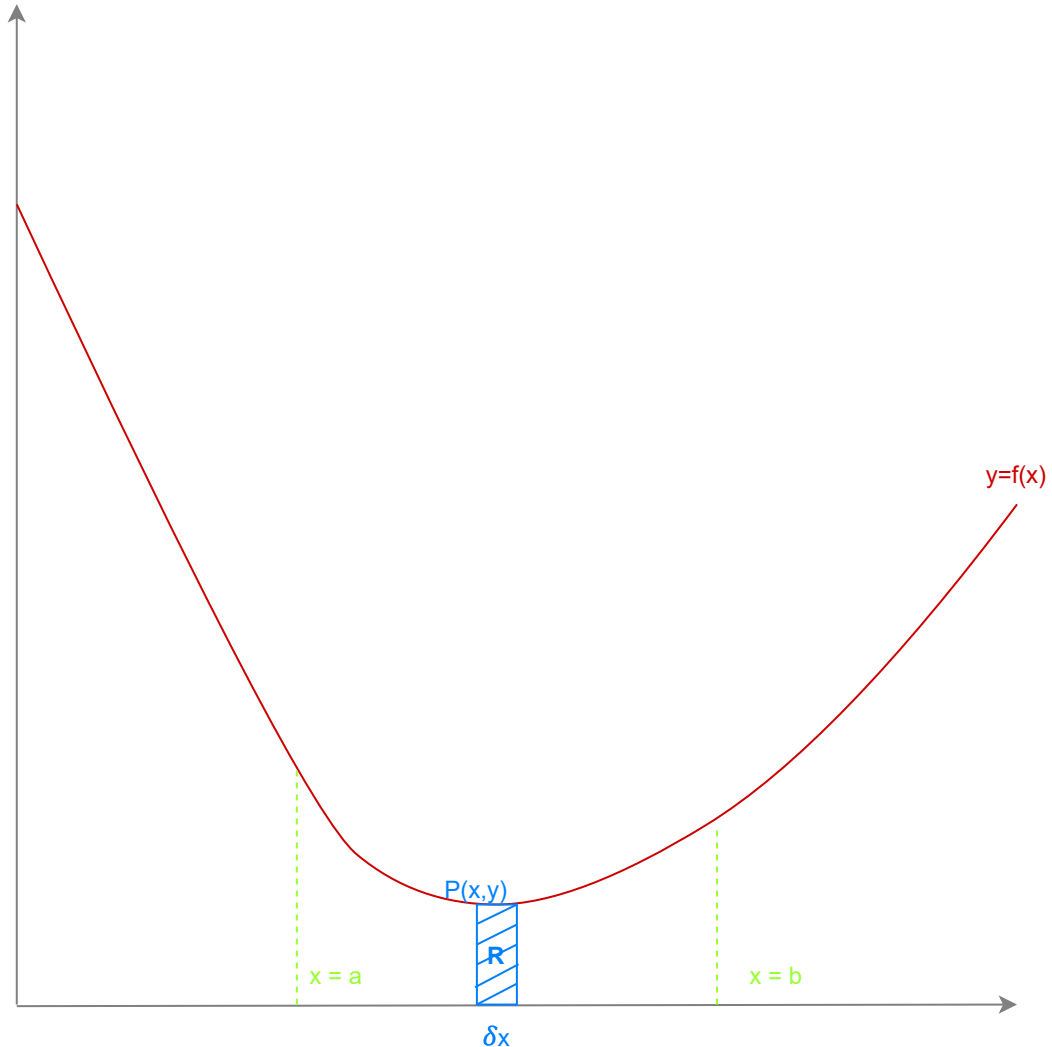


Integration

Integration is the reverse process of differentiation.

Consider the area of the region **R** bounded by the curve $y = f(x)$, the x-axis and the lines $x = a$ and $x = b$



as shown below:

the rectangle with base δx is repeated along the x axis to fill area **R**.

As

$$\lim_{\delta x \rightarrow 0} \sum_{x=a}^{x=b} y \delta x \approx R \{ \text{area} \}$$

This notation is commonly shortened to:

$$\int_a^b y dx$$

Types of integrals

To perform an integral on a polynomial of the form kx^n :

Definite integral

$$\int (kx^n) dx = \frac{k}{n+1} x^{n+1} + C$$

Indefinite integral

$$\int_b^a (kx^n)dx = \left[\frac{k}{n+1} x^{n+1} \right]_b^a$$

For the indefinite integral, $b < a$.

The difference between types of integrals:

- A definite integral has bounds, and thus, the results of a definite integral are a single number, obtained by taking the result of the integrated formula when the upper bound is used as x , and subtracting the lower bound when used as x .
- Definite integrals are generally used when you want to find the area under some function $y = f(x)$ between a given bounds.
- An indefinite integral results in a formula with an extra unknown, C , this value is equal to the y intercept of the resulting function. This artifact of integrating is left over because after integrating, there may be many equations of the form provided that satisfy the conditions.