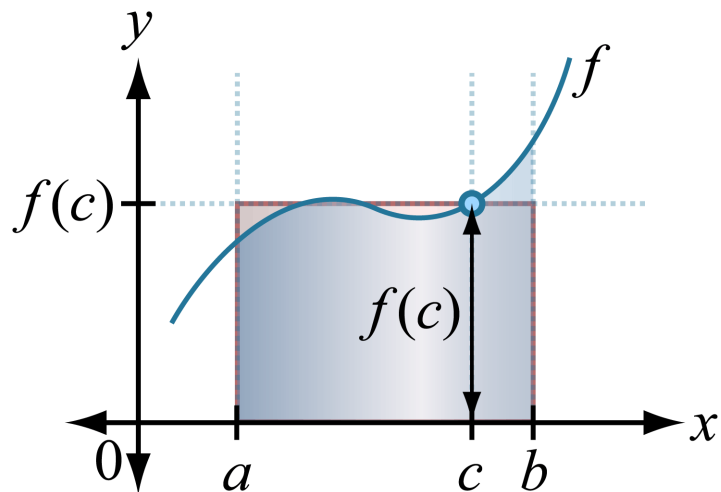


Using integrals to compute planar areas

Average values of functions



Definition

The average value of a function f on an interval $[a, b]$ is

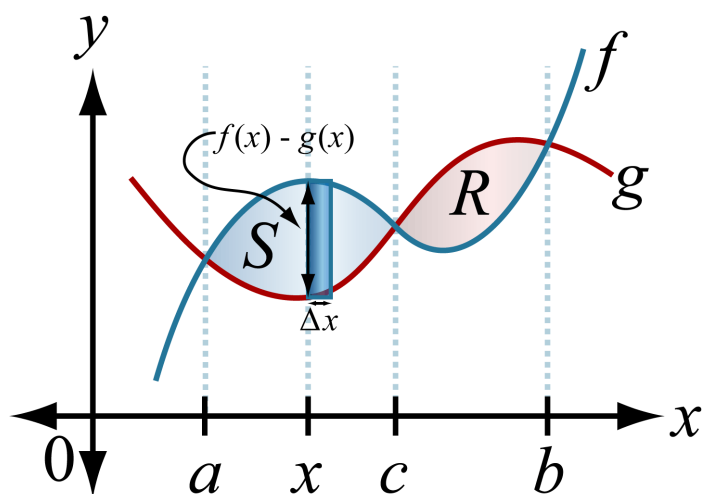
$$f_{\text{AVG}} := \frac{1}{b-a} \int_a^b f(x) \, dx$$

Theorem

If function f is continuous on $[a, b]$, then there is at least one value of $x = c$ on $[a, b]$ where

$$f(c) = f_{\text{AVG}}$$

Areas bounded between plots of functions



1. Draw a large figure. Large means that there is enough space to mark the figure up with comments.
2. Draw a representative rectangular strip.
3. To use horizontal strips instead of vertical strips, replace x with y , TOP with RIGHT, and BOTTOM with LEFT throughout the following formulas.

$$\Delta A(x) = [f_{\text{TOP}}(x) - f_{\text{BOTTOM}}(x)] \Delta x$$

$$A = \int_a^b [f_{\text{TOP}}(x) - f_{\text{BOTTOM}}(x)] \, dx$$