Contents

Chapter 1

Calc 5.1 – Area between two curves

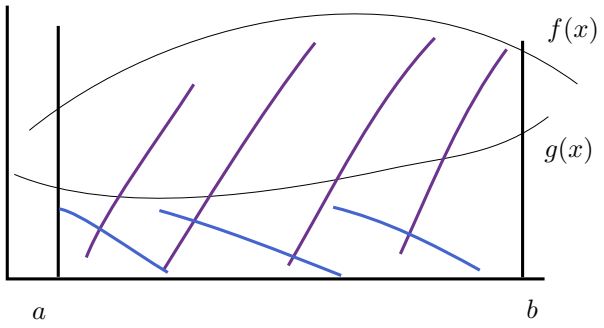

Figure 1.1: area-between-curves-1

Area between $f(x)$ & $g(x)$.

$$A = \text{Area under } f(x) \text{ - Area under } g(x).$$

$$A = \int_a^b f(x)dx - \int_a^b g(x)dx.$$

$$A = \int_a^b [f(x) - g(x)]\, dx.$$

Notitz:

$$f(x) \geq g(x)$$
$$\forall x \in [a, b].$$
$$(f(x) \text{ is above } g(x))\,.$$

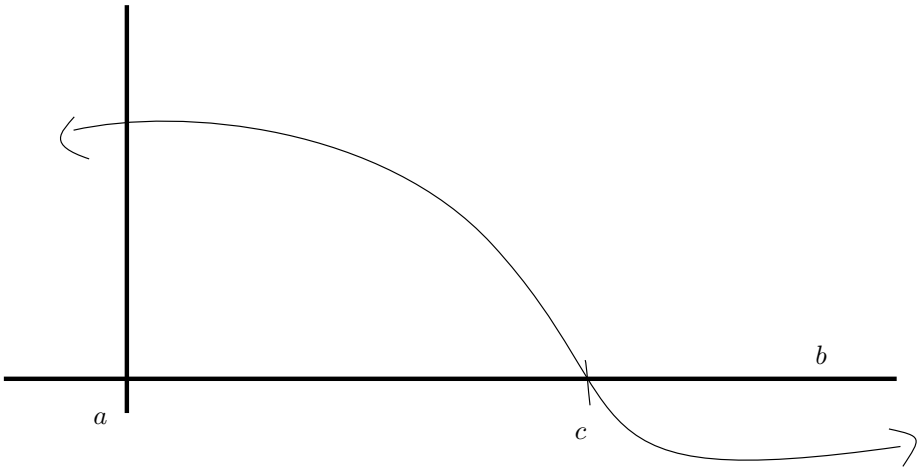

Figure 1.2: are-between-curves-2

$$\int_a^c [f(x) - 0]\,dx + \int_c^b [0 - f(x)]\,dx$$

$$\int_a^c f(x)dx - \int_c^b f(x)dx$$

Beispiel:

Find the area bounded above by $y = 2x + 5$, and bounded below by $y = x^3$ on $[0, 2]$

$$\begin{aligned} A &= \int_0^2 (2x + 5) - x^3 \mathrm{dx} \\ &= \int_0^2 2x + 5 = x^3 dx \\ &= x^2 + 5x - \frac{x^4}{4}]_0^2 \\ A &= \left[2^2 + 5 \cdot 2\frac{2^4}{4}\right] - [0] \\ A &= 10 \end{aligned}$$

Beispiel:

Find area between $y = x^2$ and $y = x + 6$.

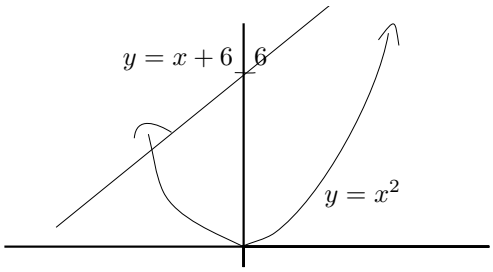

Figure 1.3: area-between-curves-3