

Announcements

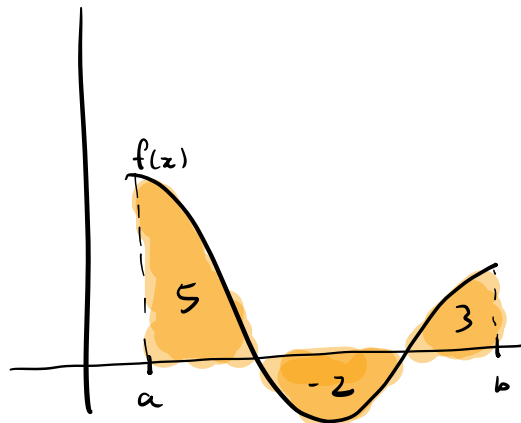
- Homework 6 posted later today,
due next Wednesday at 5 pm
- Homework 5 redos due this Friday
- Quiz Monday on power series.

Review of integral basics

The definite integral of a function f over the interval from $x=a$ to $x=b$

is $\int_a^b f(x) dx =$ the signed area between f and the x -axis over $[a, b]$.

Example



$$\int_a^b f(x) dx = 5 - 2 + 3 = 6$$

It's defined using Riemann sums, a concept you probably saw in calculus 1, but we'll only go into those details as needed

Example Find the following integrals

using the graphs of functions and geometry :

$$\textcircled{1} \int_1^5 -3 dx$$

$$\textcircled{2} \int_{-1}^3 2x dx$$

$$\textcircled{3} \int_0^4 (1+3x) dx$$

We won't always be able to use geometry...

Fundamental theorem of calculus

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

Note sometimes we see the theorem written as:

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

where $F'(x) = f(x)$

We call $F(x)$ an antiderivative of $f(x)$

when $F'(x) = f(x)$.

Examples Find the following integrals using the FTC

$$\textcircled{1} \int_1^3 (3x^2 + 4x + 1) dx$$

$$\textcircled{2} \int_0^1 (5x^3 - 3\sqrt{x}) dx$$

$$\textcircled{3} \int_0^5 e^x dx$$

$$\textcircled{4} \int_0^{\pi} \sin x dx$$