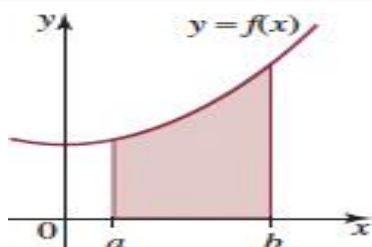


Goals



By the end of this week, you should be able to:

- understand the concept of the signed area function $F(x) = \int_a^x f(t)dt$
- understand and use the theorem: $F'(x) = \frac{d}{dx} \left(\int_a^x f(t)dt \right) = f(x)$, and illustrate its proof geometrically
- understand the formula $\int_a^b f(x)dx = F(b) - F(a)$ and use it to calculate definite integrals

Theoretical Components

Exact area under the curve using definite integral:

<http://www.youtube.com/watch?v=ODwkTt0RM Dg&feature=relmfu>

<https://www.youtube.com/watch?v=GtCYrxTjH4>

<https://www.khanacademy.org/math/ap-calculus-ab/fundamental-theorem-of-calculus-ab/fundamental-theorem-of-calculus-tut-ab/v/fundamental-theorem-of-calculus>

Properties of definite integrals

Definite integrals have the following five properties.

1. $\int_a^a f(x) dx = 0$
2. $\int_a^b f(x) dx = \int_a^c f(x) dx + \int_c^b f(x) dx, a < c < b$
3. $\int_a^b kf(x) dx = k \int_a^b f(x) dx$
4. $\int_a^b [f(x) + g(x)] dx = \int_a^b f(x) dx + \int_a^b g(x) dx$
5. $\int_a^b f(x) dx = -\int_b^a f(x) dx$

Practical Components

Complete the following questions. Organise your solutions neatly in your exercise book.

You will require Chapter 9 of Maths Quest Methods (pdf – Google Classroom).

The fundamental theorem of calculus is $\int_a^b f(x) dx = [F(x)]_a^b = F(b) - F(a)$, where $F(x)$ is an antiderivative of $f(x)$.

Ex 9E The fundamental theorem of integral calculus

- Q's 1 (1st col), 2 (b,h,k,q), 5 (a,c,d), 6, 10

Investigation

Complete the quiz on Mathspace.

Complete the quiz on Mathspace.

QFO

Quiz/Forum/Other