Khyle Calpe

405016683

11/27/2017

Math 31A Lecture Notes: The Fundamental Theorem of Calculus Parts I and II

Fundamental Theorem of Calculus Part I (FTC I)

Theorem; FTC I:

continuous with antiderivative

↓ ↓

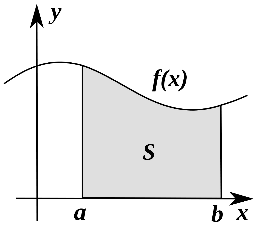
Definite integral Antiderivative/Indefinite Integral

Definition:

“” = =

↓ ↓

net change of on



Fundamental Theorem of Calculus Part II (FTC II)

Definition: = signed area from a to x

is called the area function of with lower limit a.

Example 1: Find a formula for the area function

Solution: is an antiderivative of . By the FTC,

the function

Theorem; *FTC II*:

Assume that is a continuous function on an open interval I and height be a part of I.

Then the area function

Is an antiderivative of , i.e.

Furthermore, fulfills the initial condition

Proof:

To simplify the proof, we assume that is increasing on

, by continuity

By the Squeeze theorem,

Remark: definite integral/signed area indefinite integral/antiderivative

FTC I:

FTC II:

Example 2: Let be the antiderivative of satisfying

Express F as an integral

Solution: By FTC