

Fundamental Theorem of Calculus

Using geometry, find: $\int_0^3 (x - 2) dx$

Fundamental Theorem of Calculus

If f is continuous on $[a, b]$ and F is an antiderivative of f on $[a, b]$,

$$\text{then } \int_a^b f(x) dx =$$

$$=$$

(NOTE: FTC also holds true for non-continuous functions, since the Newton-Leibniz Axiom states that f does not need to be continuous, but only that f is Riemann integrable)

Example:

• Evaluate: $\int_0^3 (x - 2) dx$

Evaluate each integral

Example 1: $\int_1^2 (x^2 - 3) dx$

Example 2: $\int_1^4 \sqrt{x^3} dx$

Example 3: $\int_{-2}^{-1} \left(u - \frac{1}{u^2}\right) du$

Example 4: $\int_0^{\pi/4} \sec^2 x \, dx$

Example 5: $\int_{-8}^{-1} \frac{x-x^2}{\sqrt[3]{x}} \, dx$

Example 6: $\int_0^2 |2x - 1| \, dx$