

MATH 101

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2020

Learning Goals

(1) Approximate the area between a curve and x -axis by using **left**, **right**, or **midpoint** sums. Interpret a definite integral in terms of the area between a curve and x -axis. Compute definite integral by using the **Riemann Sum**, the definition of definite integral.

Examples,

- ▶ Estimate the area under the graph $y = \sqrt{x}$ from $x = 0$ to $x = 4$ using N approximating rectangles and right endpoints. Sketch the graph and rectangles. Is your estimate an underestimate or overestimate?
- ▶ Write an integral that is defined by the expression

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{\pi}{n} \sin\left(\frac{i}{4n}\right).$$

- ▶ Use the definition of a definite integral to show that

$$\int_a^b x^2 dx = \frac{b^3 - a^3}{3}.$$