

4.2 Area

Sigma Notation Σ

$\sum_{i=1}^n$ is a representation of **summation** from $i = 1$ to $i = n$

$$\sum_{i=1}^n a_i = a_1 + a_2 + a_3 + a_4 + \dots + a_n$$

where i is the **index of summation**
and a_i is the **ith term** of the sum

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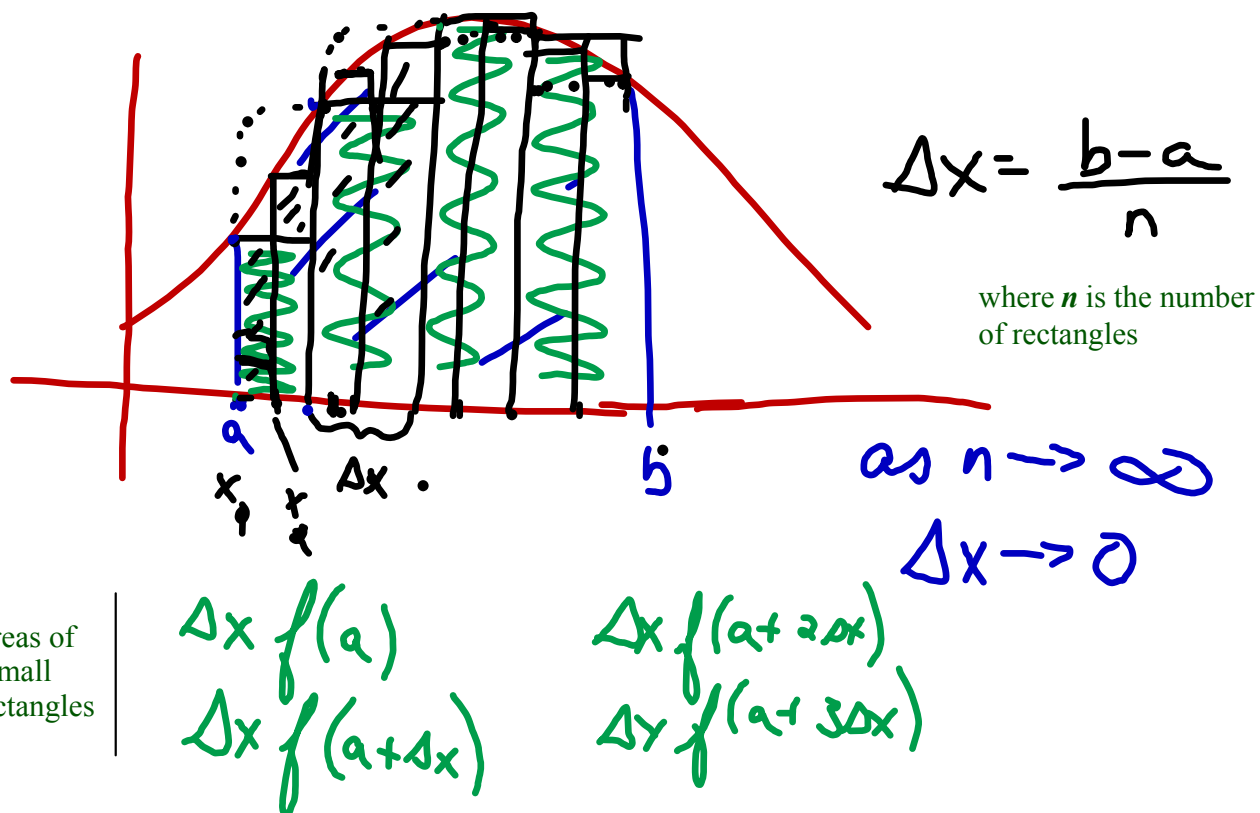
$$\sum_{i=1}^n a_i = a_1 + a_2 + a_3 + \dots + a_n$$

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$$\sum_{j=3}^5 \frac{1}{j} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$$

$$\# 3 \quad \sum_{k=0}^4 \frac{1}{k^2+1} = \frac{1}{0^2+1} + \frac{1}{1^2+1} + \frac{1}{4^2+1} + \frac{1}{9^2+1} + \frac{1}{16^2+1}$$

To find the **area under the curve** over a specified interval, we would need to divide it into lots of little polygons, such as rectangles, for which we can find the area with known formulas.



Definition of Area

Def. of Area of a Region in a Plane

Let ¹ f is cont. and ² non-negative on $[a, b]$. The area of the region bounded by the graph of f , the x -axis, and the vertical lines $x=a$ and $x=b$ is:

$$A = \lim_{n \rightarrow \infty} \sum_{i=1}^n f(c_i) \Delta x \quad x_{i-1} < c_i < x_i$$

where $\Delta x = \frac{b-a}{n}$

as $n \rightarrow \infty$, $\Delta x \rightarrow 0$