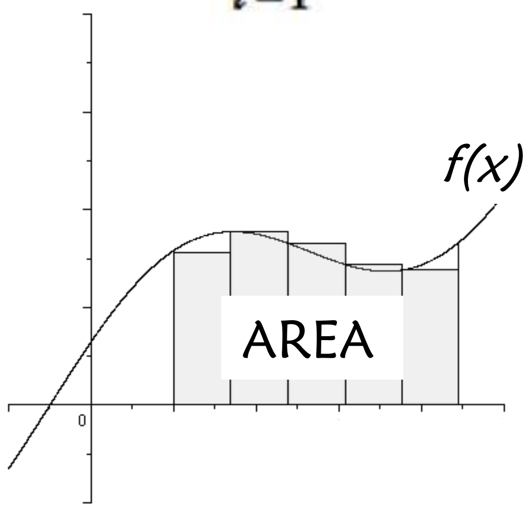
Definition of an Integral

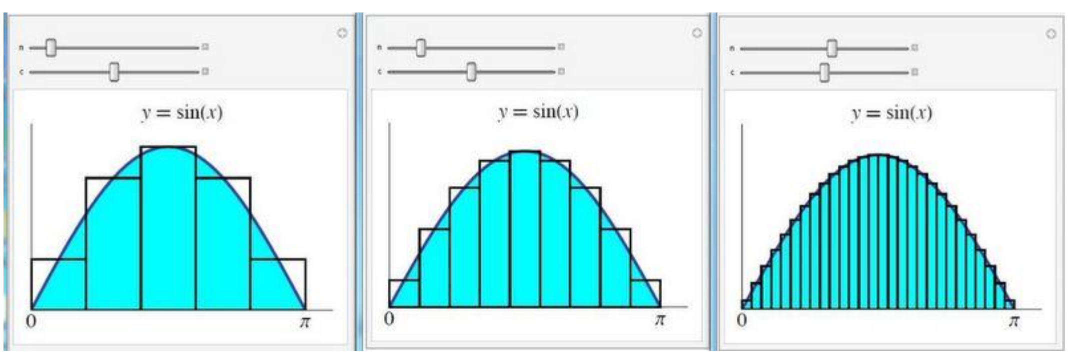
$$\text{AREA} = \sum_{i=1}^{n} f(x_i)\Delta x$$



So far we have determined that we can estimate the area under a function f(x) by **adding up the area of rectangles below the curve**.

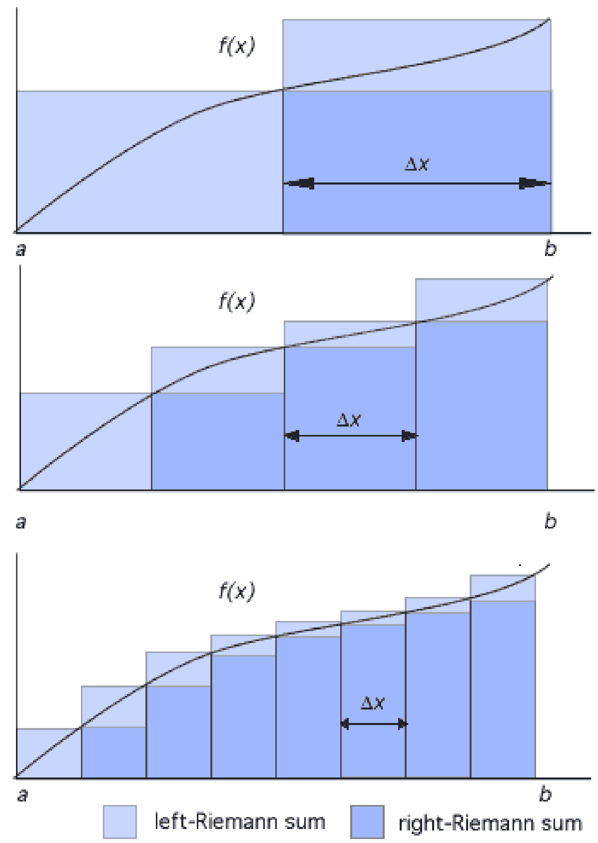
We call this method a **Riemann Sum** and it is explicitly expressed by the formula to the right

You can imagine that as we increase **n** (our number of rectangles) our estimate of AREA will become more accurate (see below).



Definition of an Integral

To increase **n** to ***infinity*** we can write the following ***limit*** as ***n*** approaches infinity which will give us the ***exact area*** under the function!



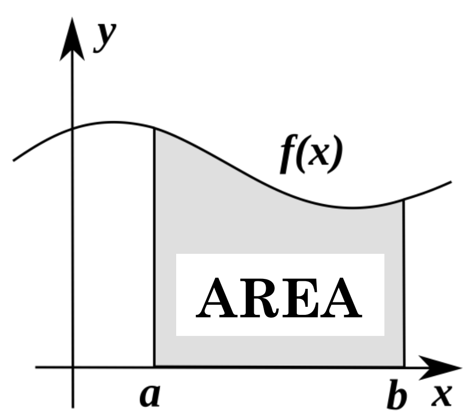
AREA $$= \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\,\Delta x$$

This **limit** of a Riemann Sum can be evaluated for any function between **a** and **b**, and will give the ***actual*** area under the curve not just an estimate.

As we saw earlier Riemann Sums can be tedious and so can limits.

Luckily, it has been discovered that this type of limit can be solved much more easily using an alternative procedure called **integration** or the **"anti-derivative"**

$$\int_a^b f(x)\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\,\Delta x$$



In this next section we will be learning a new simplified method that we can use on to easily find out area below them.

This new method is called:

Integration

(or the Antiderivative)