

**FAR
BEYOND**

MAT122

Area Under Curve – part I



Stony Brook University

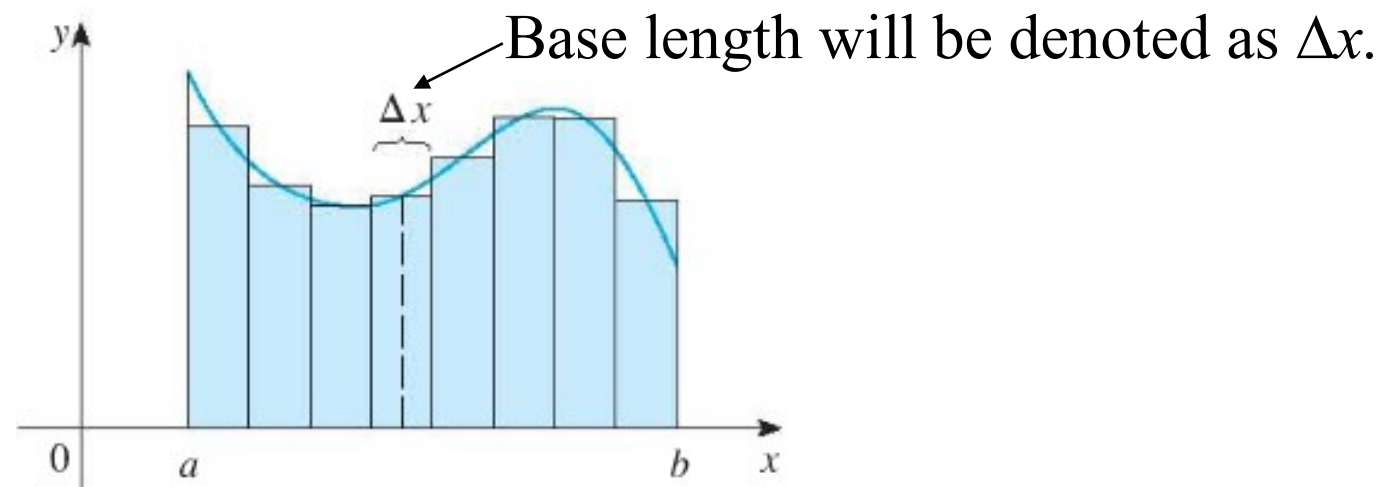
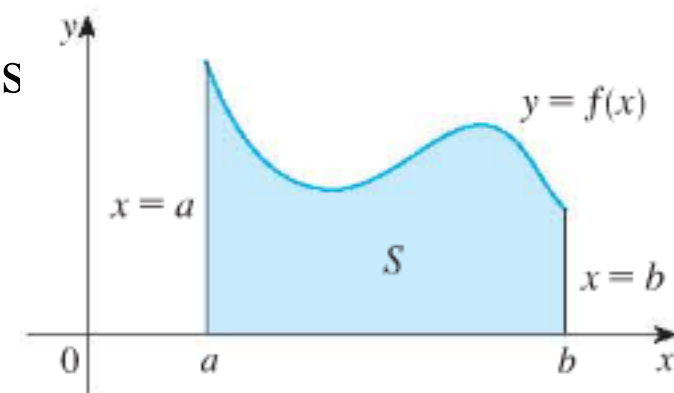
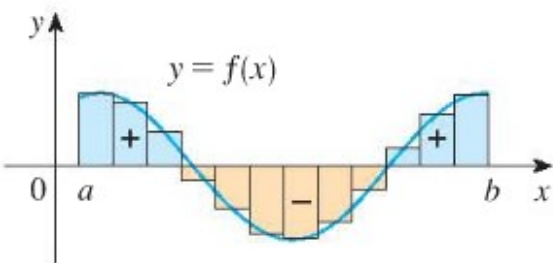
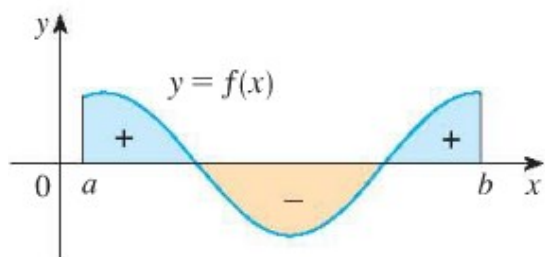
Area Under a Curve – Non-standard Shape

When dealing with non-standard shapes, a method for finding the area under a curve is to *estimate* the area using a series of rectangles since the area formula for the rectangle is known.

This technique is called **Riemann Sum**.

Each rectangle will have the same base.

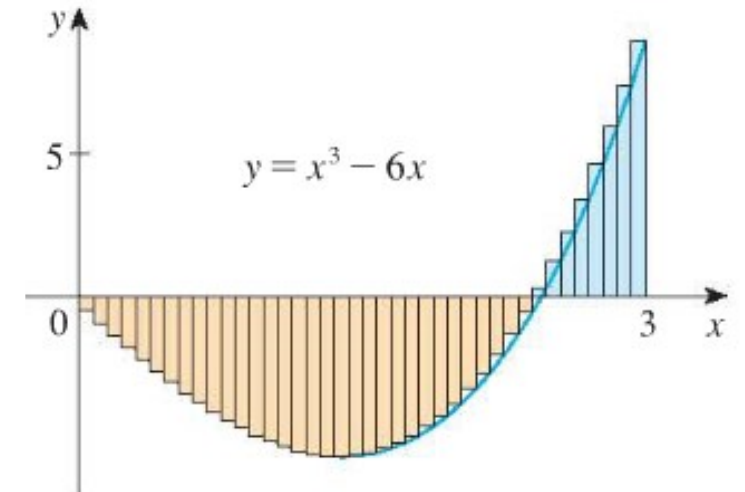
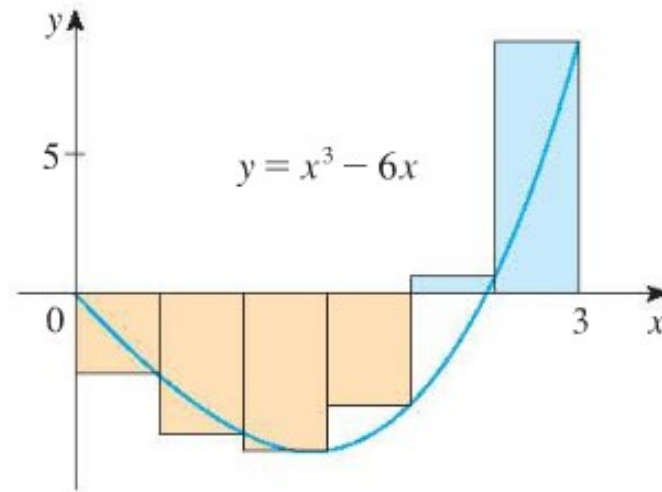
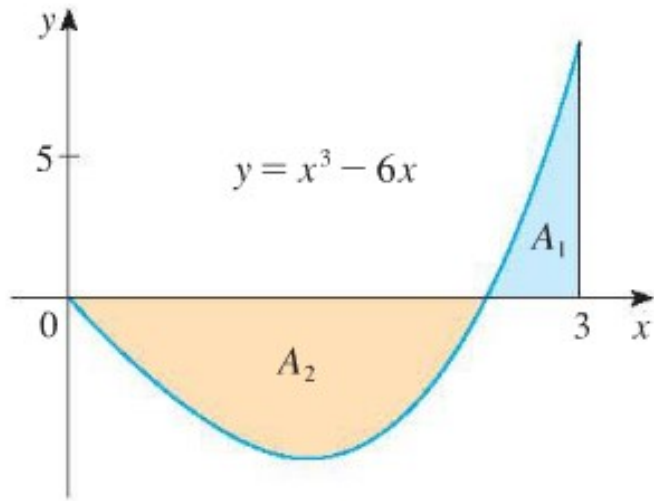
Recall: find net area:



Accuracy of Riemann Sum

The accuracy of the estimation will increase when more boxes are used.

When finding the estimate of this area: Accuracy using these boxes will be low... ... while accuracy using these will be high.



Left-Hand and Right-Hand Riemann Sums

The heights of the boxes are determined by the y -values of the function.

Boxes may be drawn with **left** side touching the function:

Boxes may be drawn with **right** side touching the function:

$$L_n = \Delta x(f(x_0) + f(x_1) + \dots + f(x_{n-1}))$$

$$R_n = \Delta x(f(x_1) + f(x_2) + \dots + f(x_n))$$