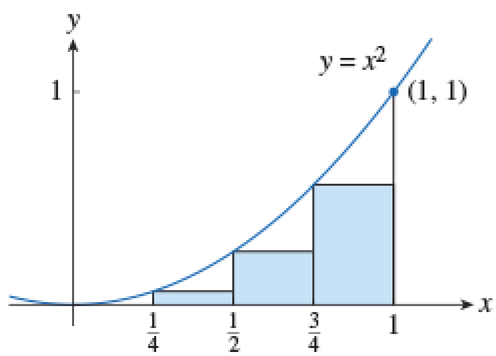
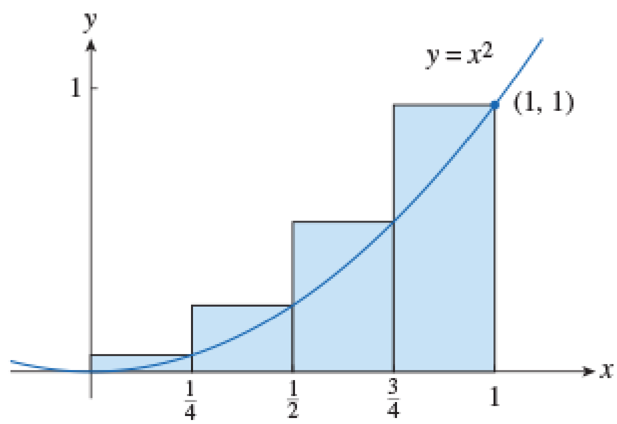
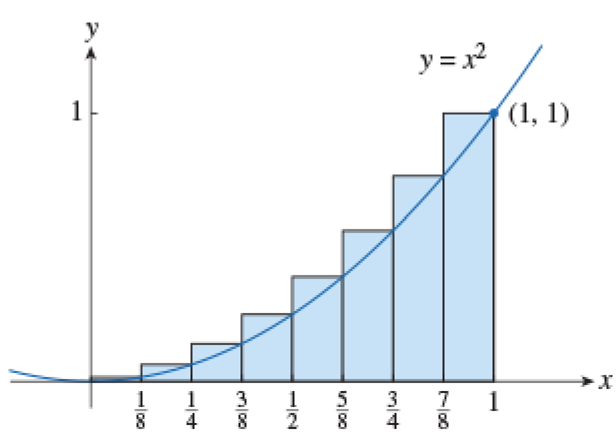
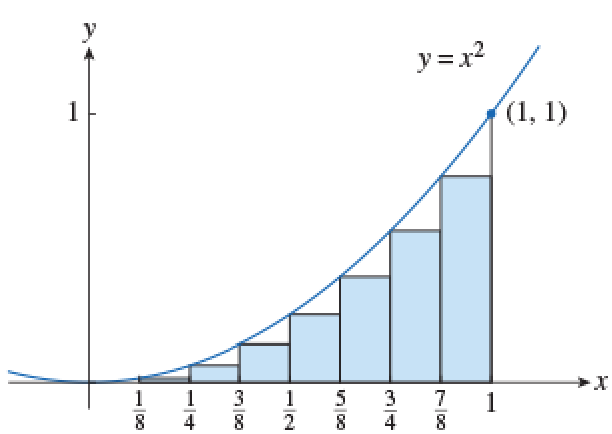
REVISIT: set up R_6 under $f(x) = \sin x$ from $x = 0$ to $x = \dfrac{3\pi}{2}$ using *sigma notation*.

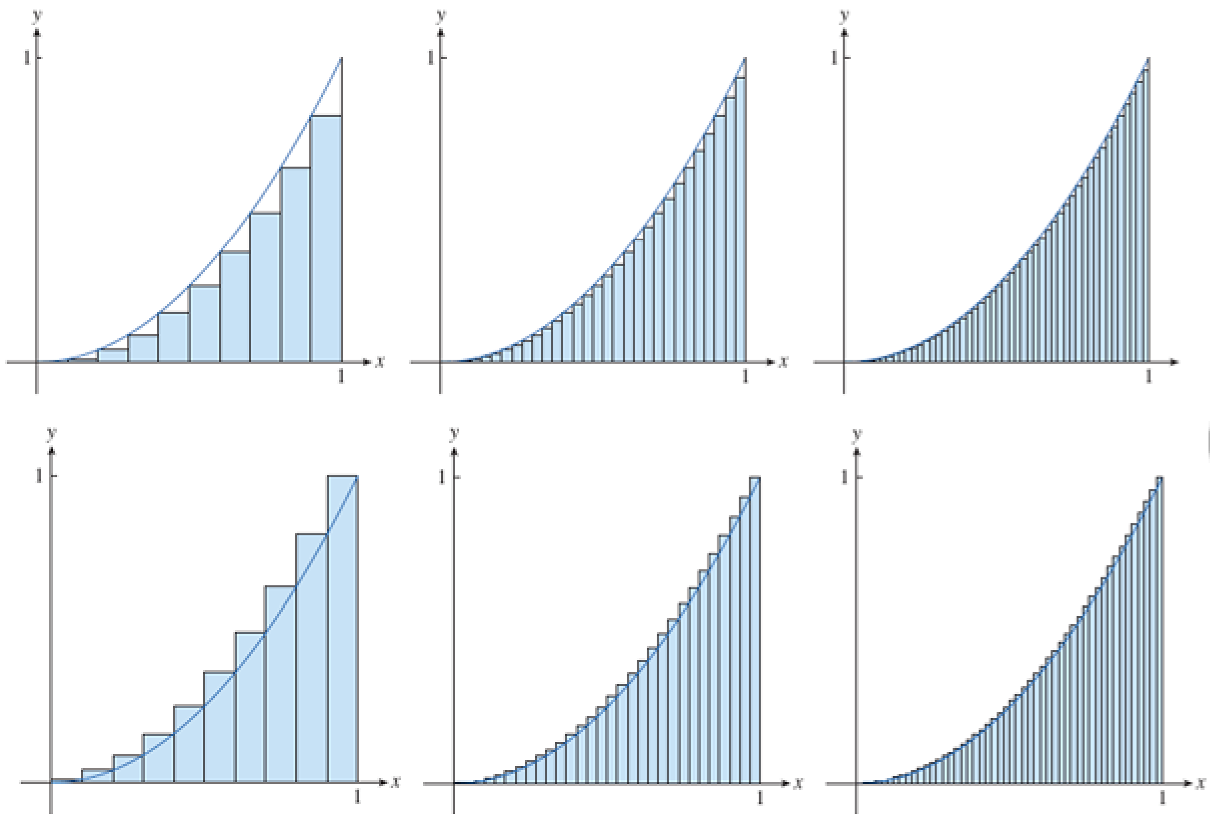






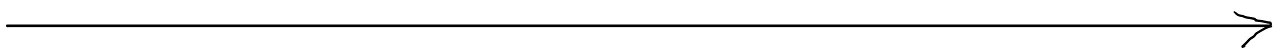


Remember, to increase the accuracy of the estimate, ____



What is long term solution to find the EXACT area under the curve???

First, expand to "*n*" slices:



$R_n =$

$L_n =$

Now, use INFINITELY MANY slices:

Examples using the above definition of area:

ex. Determine the function and its interval whose area is equal to:

ex. Given use the definition to express area using sigma and limit notation.

Definite Integral **Section 5.2**

If *f* is defined on $[a,b]$ then

For now, let's do an example using the shape of a *standard* area:

ex. $\int_0^1 \sqrt{1-x^2}\,dx$

Fundamental Theorem of Calculus, Part 1

Establishes a connection between

differential calculus and integral calculus.

They are <u>inverse</u> processes:

If f is a **positive** function then

$g(x)$ can be interpreted as

the area under the graph of f from a to x

where x can vary from a to b.

FTC Part 1:

Review Common General Antiderivatives **Section 4.8**

recall: f is the original function and F is its **general antiderivative**

Power Function: $f(x) = x^n$

Exponential Function: $f(x) = e^x$

Logarithmic Function: $f(x) = \frac{1}{x}$

Trigonometric Functions: $f(x) = \cos x$

$f(x) = \sin x$

Don't forget to add $+C$

Use integral notation to find antiderivatives or **indefinite integral**:

ex. $\int x^4 dx$

ex. $\int 5x^9 dx$

ex. $\int \frac{1}{x^5} dx$

ex. $\int \sqrt{x}\ dx$

ex. $\int \sec^2 x\ dx$