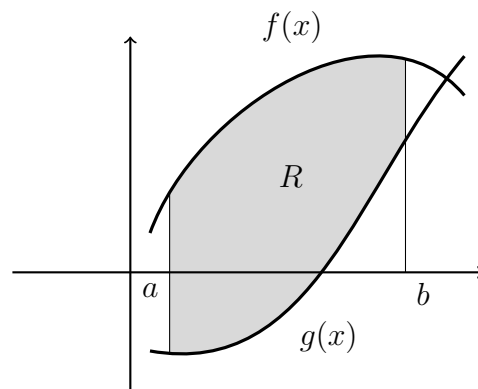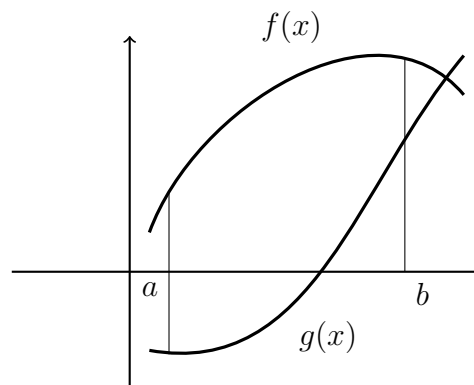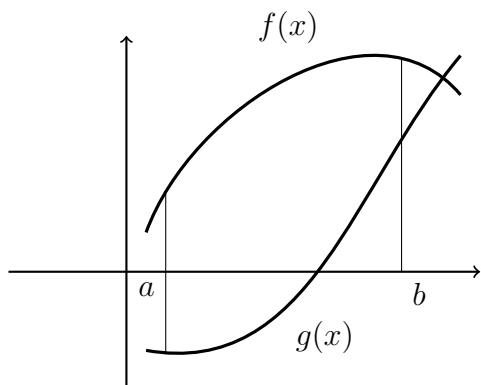---

Objectives:

- Compute the areas between curves.

Motivation: We've been computing the between a curve and the x-axis. How can we compute the area between two curves?

Consider the region, R, between the two curves $y = f(x)$ and $y = g(x)$ between the vertical lines $x = a$ and $x = b$ where f and g are continuous functions and $f(x) \geq g(x)$ for all x in $[a, b]$.

What if we used rectangles?

How can we make this approximation better?

We can express this area, A, in terms of a Riemann sum:

$$A =$$

Definition: The area A of the region bounded by the curves $y = f(x)$, $y = g(x)$, and the lines $x = a$ and $x = b$ where f and g are _____ and _____ , is

$$A =$$

1

Example 1 Find the area of the region bounded by the curves $f(x) = x^3$ and $g(x) = 0$ between $x = 1$ and $x = 5$.

Example 2 Find the area of the region bounded by the curves $f(x) = e^x$ and $g(x) = x$ between $x = 0$ and $x = 1$.

Example 3 Find the area of the region enclosed by the parabola $y = 5x - x^2$ and the line $y = x$.

Example 4 Find the area enclosed by the line $y = x - 1$ and the parabola $y^2 = 2x + 6$.