5.1 Videos Guide

5.1a

- The area between curves
  - The area A of the region bounded by the curves $y = f(x)$, $y = g(x)$, and the lines $x = a$, $x = b$, where f and g are continuous and $f(x) \geq g(x)$ for all x in $[a, b]$, is

    $$A = \int_a^b [f(x) - g(x)]\, dx$$

    An analogous expression exists for functions of y.

5.1b

Exercises:

- Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y. Draw a typical approximating rectangle and label its height and width. Then find the area of the region.
  $y = x^2, \;\; y = 4x - x^2$
- Sketch the region enclosed by the given curves and find its area.
  $x = y^4, \;\; y = \sqrt{2 - x}, \;\; y = 0$

5.1c

- In general, the area between f and g for $a \leq x \leq b$ is

  $$A = \int_a^b |f(x) - g(x)|\, dx$$

Exercise:

- Sketch the region enclosed by the given curves and find its area.
  $y = \cos x, \;\; y = 1 - \cos x, \;\; 0 \leq x \leq \pi$