Math 1300: Calculus I **Fall 2020**

Lecture: Section 6.1: More on area

Lecturer: Sarah Arpin

Today's Goal:

Logistics: Our final exam is 7:30am - 10am Wednesday December 9th. Set your phone alarms NOW. Note that this is *AM*.

Warm-Up 1.1 *Use geometry to find the area enclosed by the curves $y = 2x$, $y = 1$, $x = 1$, and $x = 2$. Hint: A sketch will help.*

(a) 3

(b) 2

(c) 1

(d) 0

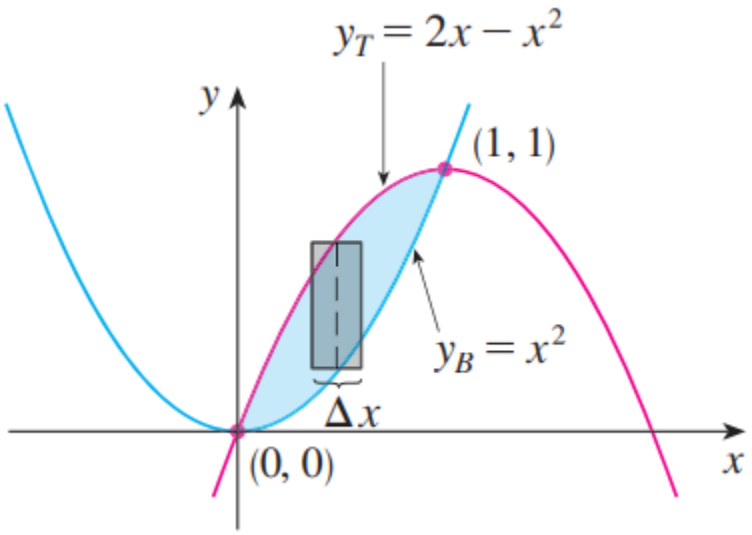
(e) None of the above.

1.1 Area between two curves

We can use integrals to compute the area between a curve and the x-axis.

We would like to extend the reach of this method: How can we compute an area that is bounded by curves, not just between a curve and the x-axis?

1.1.1 With respect to x

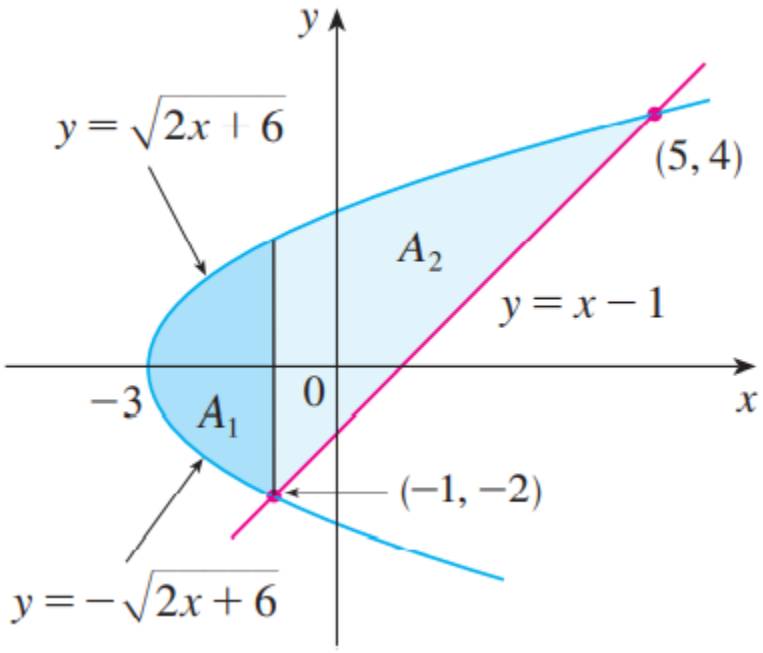


Example 1.2 *Find the area between the two curves $y = 2x - x^2$ and $y = x^2$ between $x = 0$ and $x = 1$.*

Theorem 1.3 *The area A of the region bounded by two curves $y = f(x)$ and $y = g(x)$ and the lines $x = a$ and $x = b$, where f and g are continuous on $[a, b]$ and $f(x) \geq g(x)$ for all x in $[a, b]$ is:*

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

1.1.2 With respect to y



Example 1.4 *Find the area in the shaded region above.*

Theorem 1.5 *If a region is bounded by curves with equations $x = f(y)$, $x = g(y)$, $y = c$, and $y = d$, where f and g are continuous and $f(y) \geq g(y)$ for all y in $[c, d]$, then the area of this region is given:*

$$\int_c^d [f(y) - g(y)]dy.$$

Example 1.6 *Find the area in the first quadrant bounded by the curves* $y = x$, $y = 4x$, $xy = 16$. *Hint: Sketch! You may need to split this into more than one integral.*