Calculus

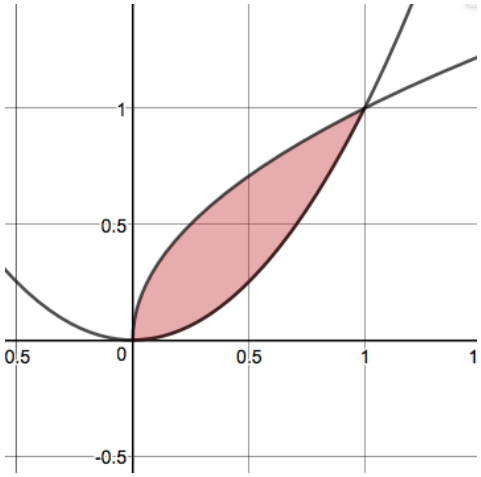
Name: Date:

5C: Area Between Curves

We now know that the key to finding area in the coordinate plane is using integrals. In this lesson, we will take what we know about integrals and use it to find the area *between* two curves.

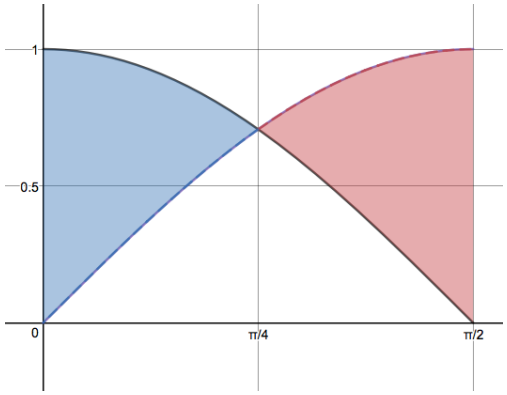
Explore

Find the area between $f(x) = x^2$ and $g(x) = \sqrt{x}$



Over-Under: When a function is first above then below another, the integral need to be ordered carefully.

Find the area between $f(x) = \sin(x)$ and $g(x) = \cos(x)$ on the interval $\left[0, \frac{\pi}{2}\right]$



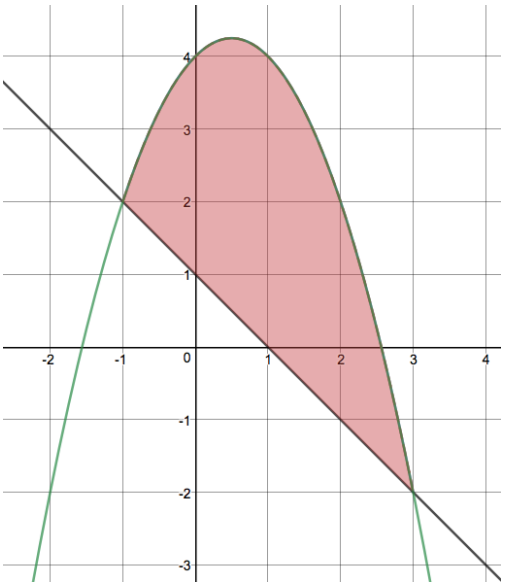
AREA OF A REGION BETWEEN TWO CURVES

If f and g are continuous on $[a, b]$ and $g(x) \leq f(x)$ for all x in $[a, b]$, then the area of the region bounded by the graphs of f and g and the vertical lines $x = a$ and $x = b$ is

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

Functions below the $x-$ *axis*: Does it change things if the shaded area is above *and* belowthe x −axis?

Find the shaded area between $f(x) = 4 + x - x^2$ and $g(x) = 1 - x$.



Functions of *y*

Find the shaded area between $f(y) = y + 1$ and $g(y) = 3 - y^2$