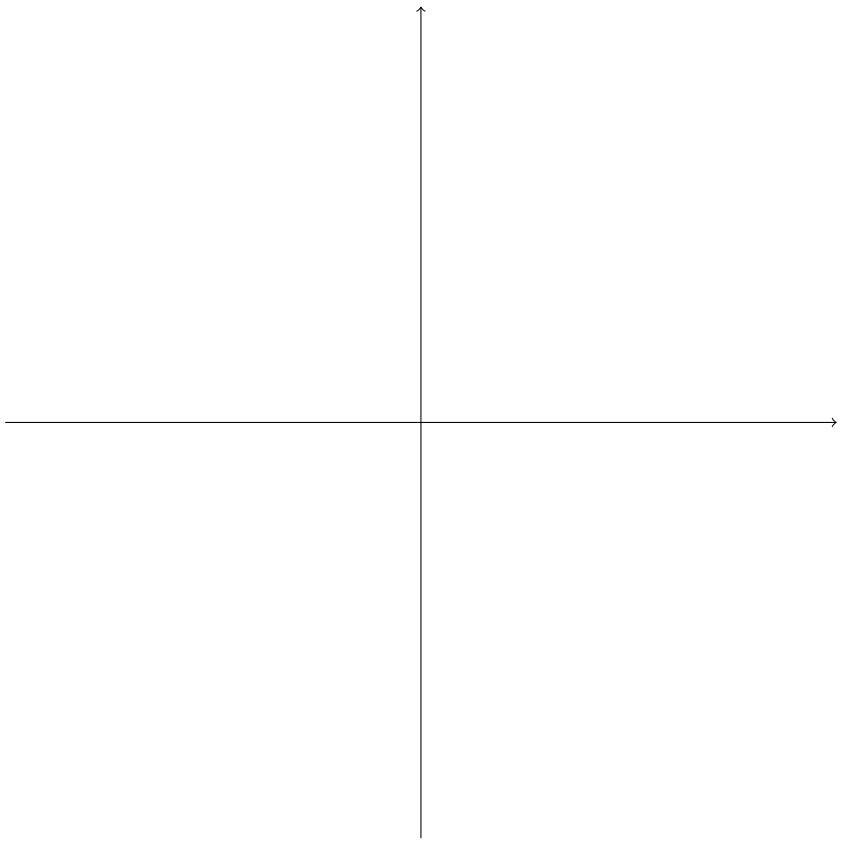
# Section 6.2

## Area of the Region Between Two Curves

Whenever a measurement can be approximated by the sum of small components, the true or limiting value will be given by an integral. Unsurprisingly, we can approach areas of regions in this manner.

Approximate the area of the region between $f(x) = \cos x$ and $g(x) = \sin x$ from $x = 0$ to $x = \frac{\pi}{4}$. The graph of the two functions.

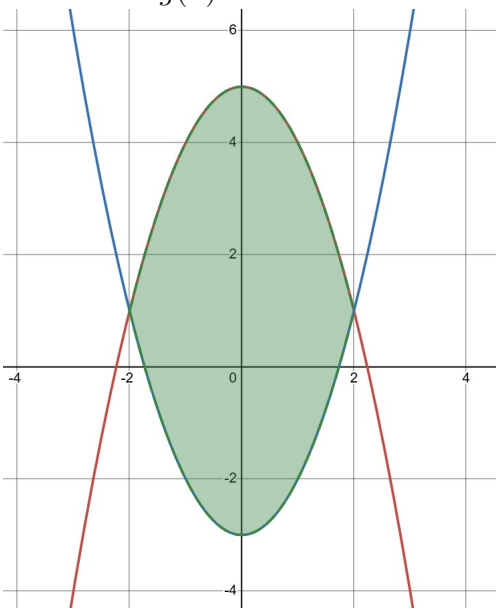


Write the approximation as a sum here:

**Theorem 6.2.1.** Suppose $f$ and $g$ are continuous on $[a, b]$ with $f(x) \geq g(x)$. The area of the region bounded by the graphs of $f$ and $g$ is given by

$$A = \int_a^b \big(f(x) - g(x)\big)dx.$$

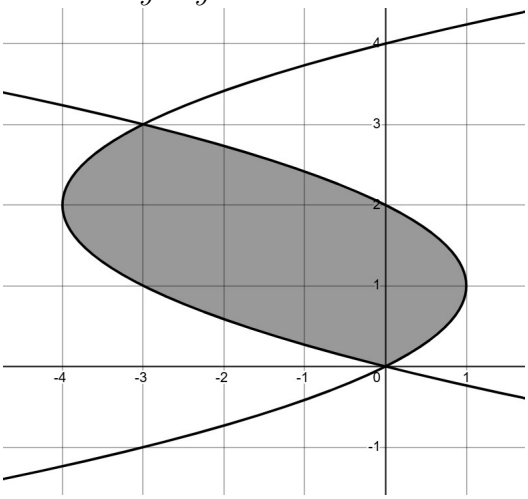
**Example 6.2.2.** Find the area of the shaded region bounded by the graphs of $f(x) = 5 - x^2$ and $g(x) = x^2 - 3$.



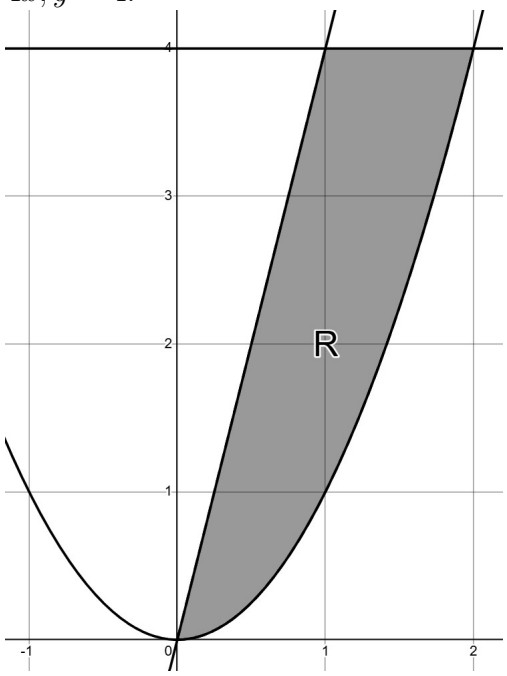
**Example 6.2.3.** Find the area of the shaded region below that is bounded by the graphs of $f(x) = 3x - x^2$ and $g(x) = |2x|$.



**Example 6.2.4.** Find the area of the shaded region bounded by the graphs $x = y^2 - 4y$ and $x = 2y - y^2$.



**Example 6.2.5.** Find the area of the region $R$ bounded by the graphs $y = x^2, y = 4x, y = 4$.



**Example 6.2.6.** Find the area of the shaded region bounded by the graphs $y = 2 - \frac{x}{2}$ and $x = 2y^2$.

