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

$$\text{Area} = \int_a^b [f(x) - g(x)]\, dx$$

Ex: Find the area of the region bounded by the graphs $y = 2 - x^2$ and the line $y = -x$.
(We must find where they intersect first)

Ex: Find the area of the region bounded by the graphs $y = 2 - x^2$ and the line $y = x$.

Ex: Find the area of the region bounded by the graphs $y = x^2 + 2$, $y = -x$, x = 0, and x = 1.

Ex: The sine and cosine curves intersect indefinitely many times, bounding regions of equal areas. Find the area of one of these regions.

Ex: Find the area in the first quadrant bounded above by $y = \sqrt{x}$ and below by the x-axis and the line $y = x - 2$.

Ex: What if we integrated with respect to y?

Ex: Find the area of the region between the graphs $y = 3x^3 - x^2 - 10$ and $g(x) = -x^2 + 2x$.

Ex: Find the area of the region bounded by the graphs $x = y^2$, $x = y^3$.

Ex: Find the area of the region bounded by the graphs $y = x^2$, $x + y = 2$.

Ex: Find the area of the region bounded by the graphs $y = 2\cos(x)$, $y = x^2 - 1$.

Ex: Find the area of the region bounded by the graphs $y = \cos^2(x)$, $y = 1$.