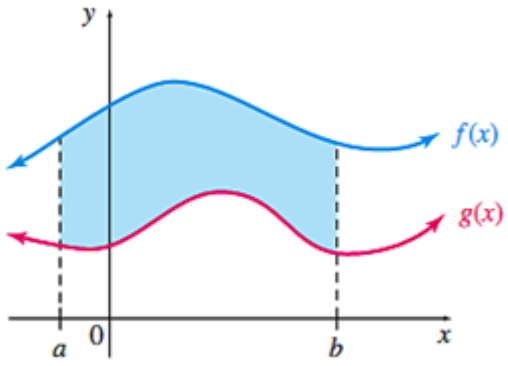
U4L4—Definite Integrals and the area between two curves

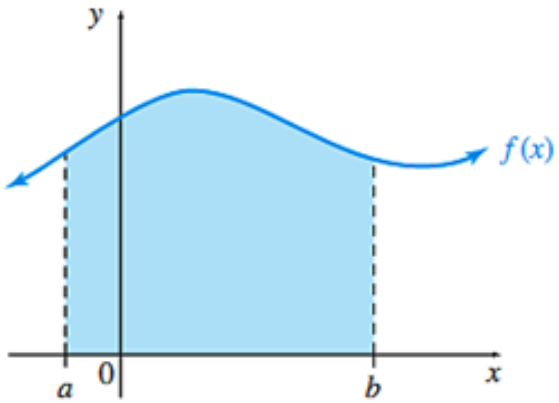
- This lesson will continue with definite integrals and relating definite integrals to area.

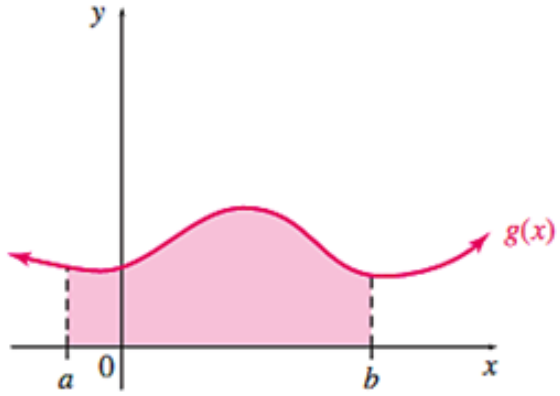
- Use properties of integrals to solve graphical net area problems.

- Use definite integrals to find the area between two curves.

Area Between two curves







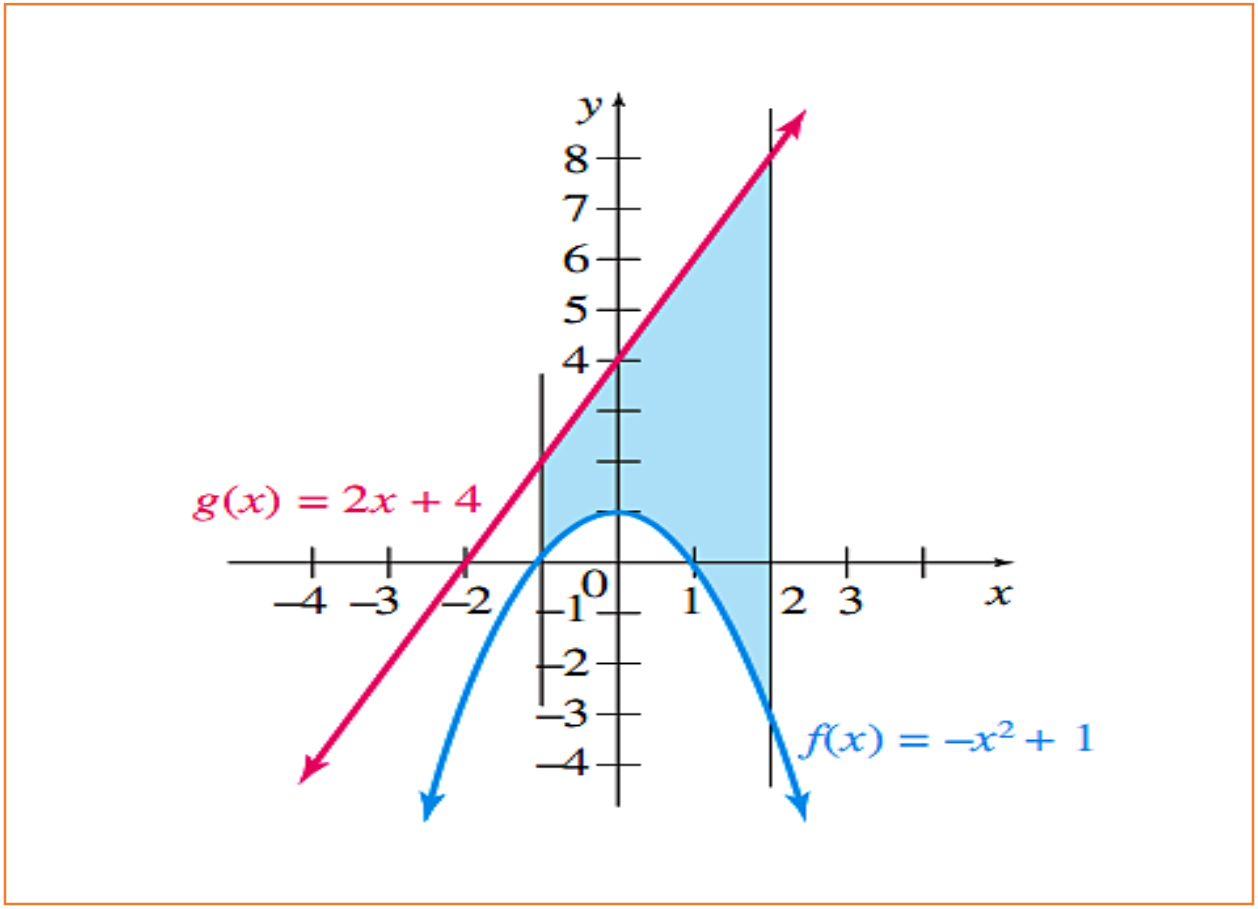
$$\int_a^b f(x)\,dx - \int_a^b g(x)\,dx = \int_a^b [f(x) - g(x)]dx$$

Area Between Two Curves

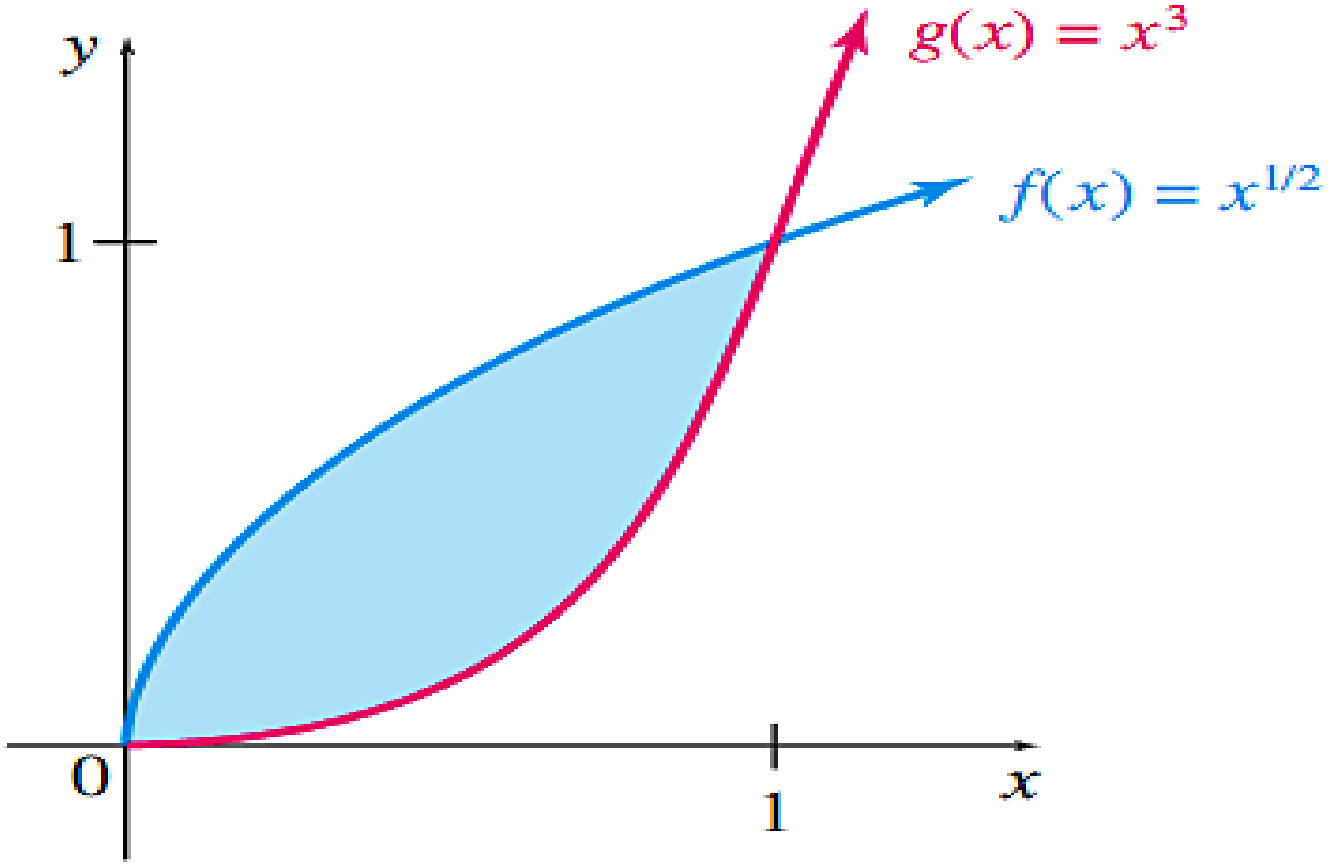
If f and g are continuous functions and $f(x) \geq g(x)$ on $[a, b]$, then the area between the curves $f(x)$ and $g(x)$ from $x = a$ to $x = b$ is given by

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

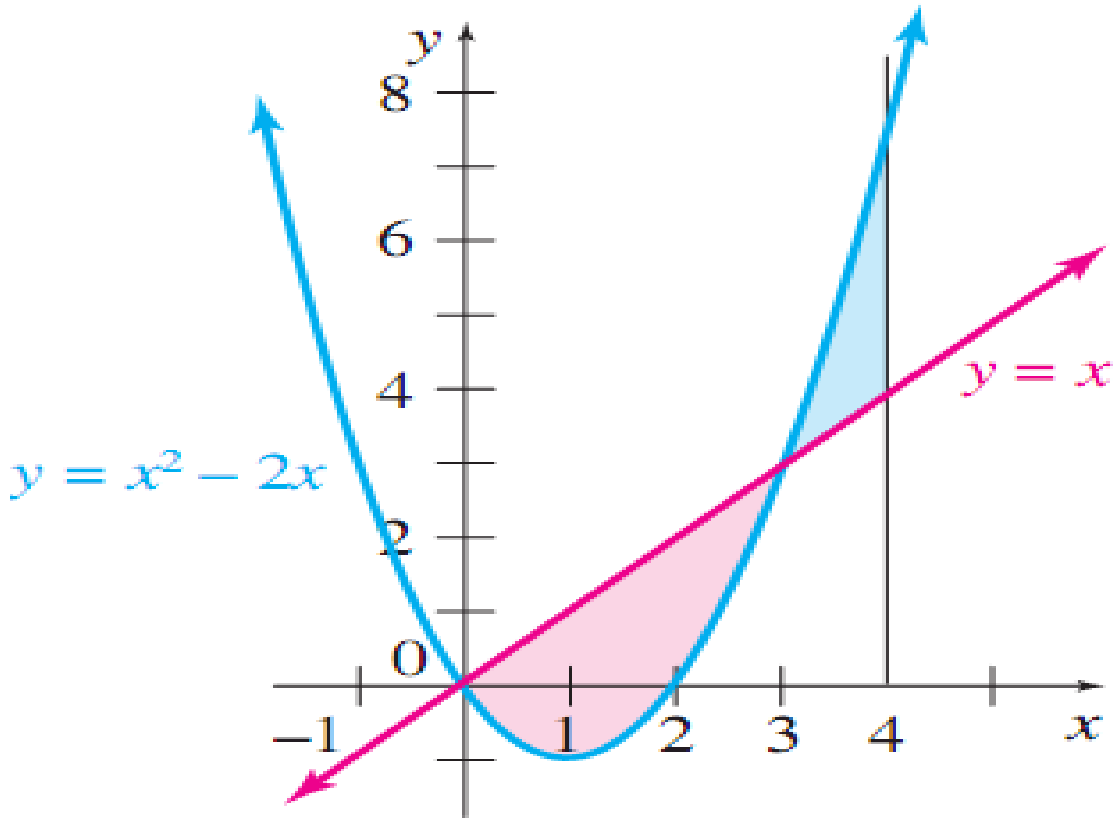
Find the area bounded by $f(x) = -x^2 + 1$, $g(x) = 2x + 4$, $x = -1$, and $x = 2$.



Find the area between the curves $y = x^{1/2}$ and $y = x^3$.



Find the area of the region enclosed by $y = x^2 - 2x$ and $y = x$ on $[0,4]$.



Find the area between $y = 11x$ and $y = x^2 - 12$ on the interval $[-2,2]$.

A. 23.6
B. 134/19
C. 169/3
D. 12/5

Find the area of the region bounded by the graphs of $y = x + 20$ and $y = x^2$.

A. 243/2
B. 167/5
C. 256/7
D. 165/3

Find the area between the x −axis and $f(x) = \frac{1}{x} - \frac{1}{e}$ on the interval $[1, e^2]$.

Find the area between $y = 2e^{3x}$ and $y = e^{3x} + e^{6}$ on the interval $[0,3]$.

A. $\frac{1}{3}e^{6} + \frac{1}{3}e^{9} + \frac{1}{3}$

B. $\frac{1}{3}e^{6} + \frac{1}{3}e^{9} + \frac{9}{30}$

C. $\frac{1}{3}e^{6} + \frac{1}{3}e^{9} - \frac{1}{3}$

D. $\frac{1}{3}e^{6} + \frac{1}{3}e^{9} + \frac{1990}{3000}$

E. $\frac{1}{3}e^{6} + \frac{1}{3}e^{9} \pm \pi \times \infty$