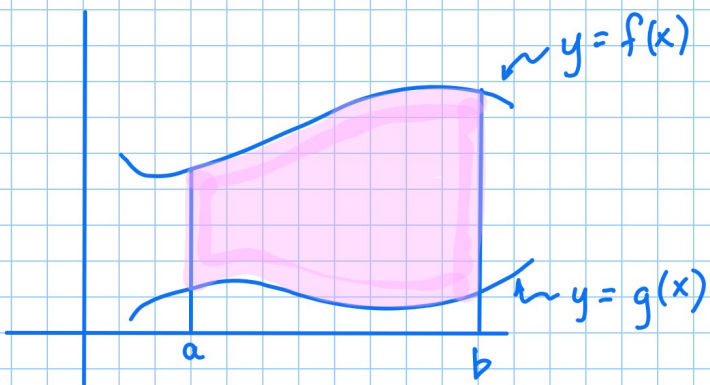


Area Between Curves



$$\text{Area under } f(x) \text{ on } [a, b] = \int_a^b f(x) dx$$

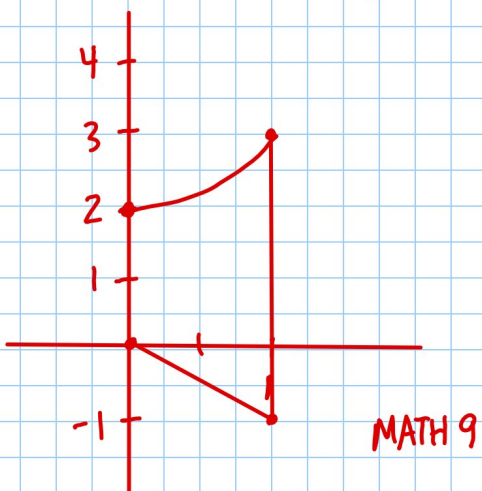
$$\text{Area under } g(x) \text{ on } [a, b] = \int_a^b g(x) dx$$

Area between $f(x)$ and $g(x)$ on $[a, b]$ is

$$\begin{aligned} & \int_a^b f(x) dx - \int_a^b g(x) dx \\ &= \int_a^b [f(x) - g(x)] dx \end{aligned}$$

TOP - BOTTOM

ex: Area enclosed by $y = x^2 + 2$, $y = -x$, $x = 0$, $x = 1$

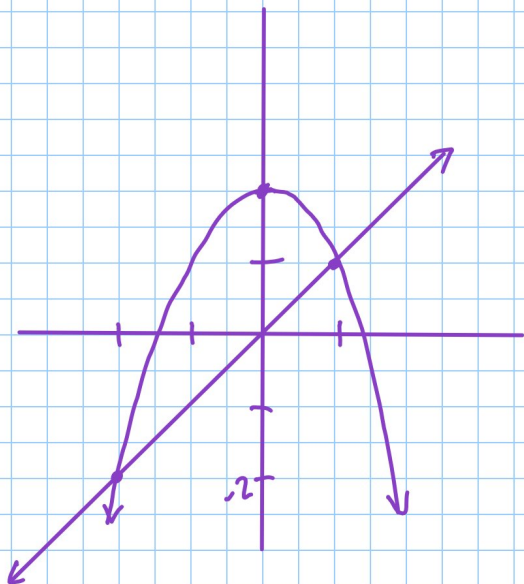


$$A = \int_0^1 [(x^2 + 2) - (-x)] dx$$

$$A = \int_0^1 (x^2 + 2 + x) dx = \boxed{\frac{17}{6}}$$

$$\text{fnInt}(x^2 + 2 + x, x, 0, 1) \rightarrow \text{FRAC}$$

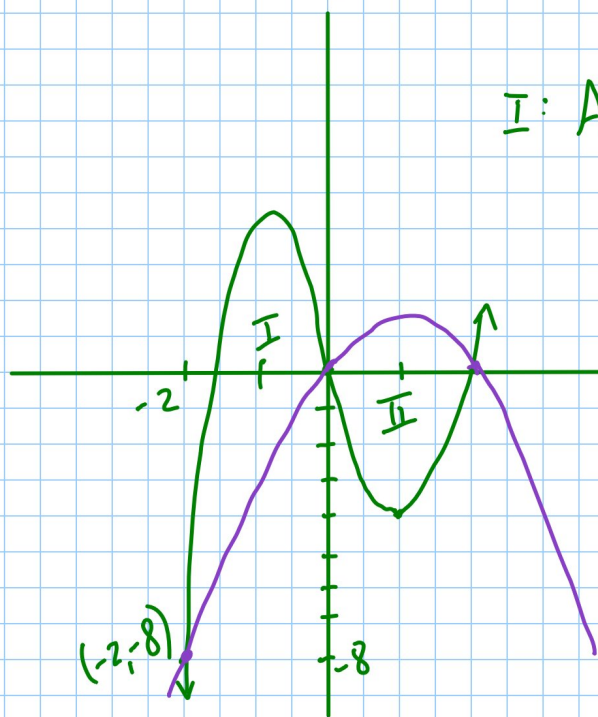
ex: Find the area enclosed by $f(x) = 2 - x^2$ and $g(x) = x$



$$A = \int_{-1}^2 (2 - x^2 - x) dx = \frac{9}{2}$$

ex: Find the area in between
 $f(x) = 3x^3 - x^2 - 10x$

$$g(x) = -x^2 + 2x$$



$$\text{I: } A = \int_{-2}^0 \left[(3x^3 - x^2 - 10x) - (-x^2 + 2x) \right] dx = 12$$

$$\text{II: } A = \int_0^2 \left[(-x^2 + 2x) - (3x^3 - x^2 - 10x) \right] dx = 12$$

$$\text{Total Area} = 24$$

Area Assignment

Sketch the region bounded by each pair of curves. Then find the area. Be sure to show the integral.

$$1) \begin{aligned} f(x) &= x^2 + 2x + 1 \\ g(x) &= 2x + 5 \end{aligned}$$

$$2) \begin{aligned} f(x) &= x^2 - 4x + 3 \\ g(x) &= -x^2 + 2x + 3 \end{aligned}$$

$$3) \begin{aligned} f(x) &= (x-1)^3 \\ g(x) &= x-1 \end{aligned} \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} \text{like} \\ \text{last} \\ \text{example} \end{array}$$

$$4) \begin{aligned} f(x) &= -x^2 + 4x + 1 \\ g(x) &= x + 1 \end{aligned}$$