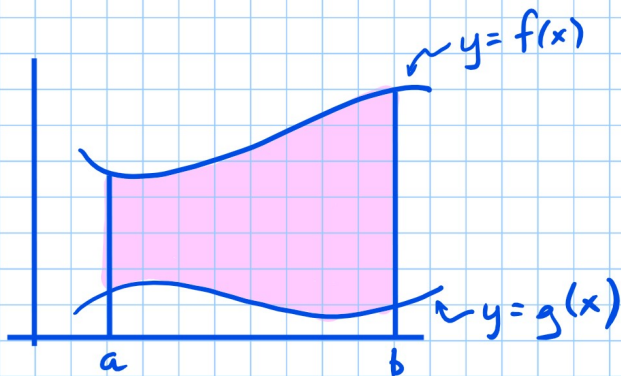


Area Between Curves



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

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

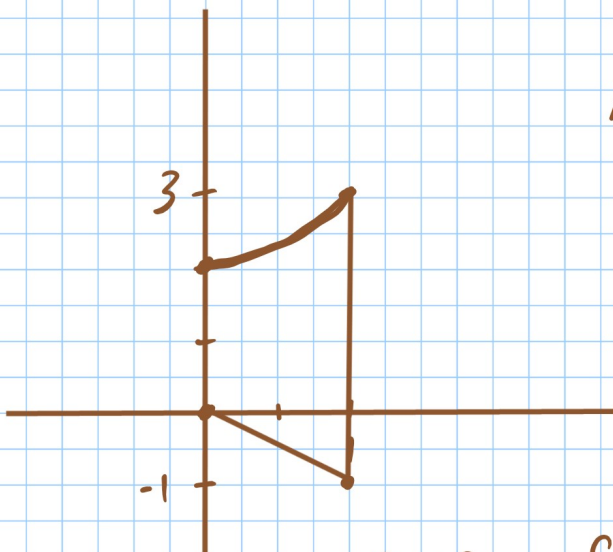
Area between $f(x)$ and $g(x)$ on $[a, b]$ is

$$\int_a^b f(x) dx - \int_a^b g(x) dx$$

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

TOP - BOTTOM

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



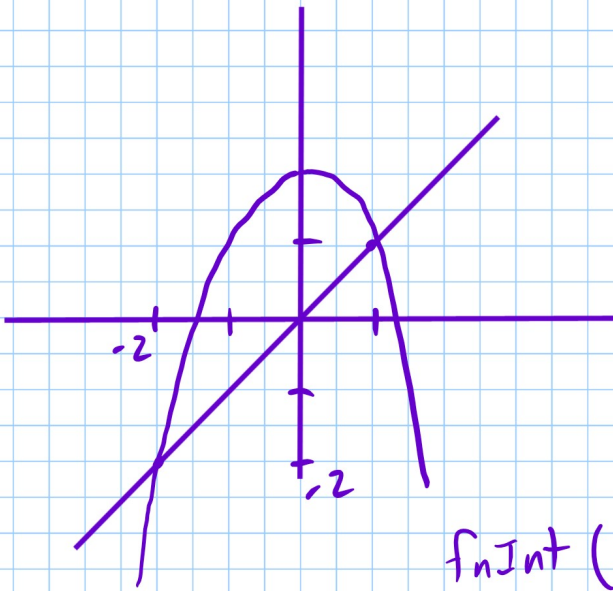
$$A = \int_0^1 ((x^2 + 2) - (-x)) dx$$

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

MATH 9

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

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



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

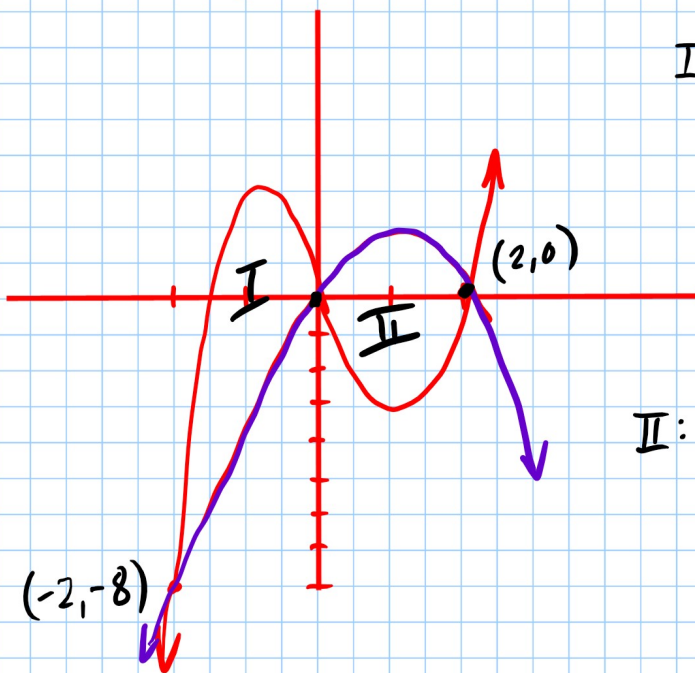
$$= \frac{9}{2}$$

$$\text{fnInt}(2 - x^2 - x, x, -2, 1) \Rightarrow \text{FRAC}$$

ex: Find area in between

$$f(x) = 3x^3 - x^2 - 10x$$

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



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

$$= 12$$

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

$$A = 12$$

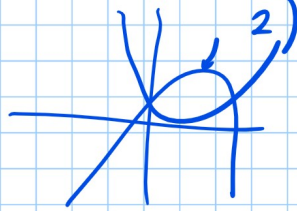
$$\text{TOTAL AREA} = 24$$

$$\text{fnInt}((-x^2 + 2x) - (3x^3 - x^2 - 10x), x, 0, 2)$$

Area Assignment

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

1) $f(x) = x^2 + 2x + 1$
 $g(x) = 2x + 5$



2) $f(x) = x^2 - 4x + 3$
 $g(x) = -x^2 + 2x + 3$

3) $f(x) = (x-1)^3$
 $g(x) = x-1$ } like last example

4) $f(x) = -x^2 + 4x + 1$
 $g(x) = x + 1$

$$\int_0^1 ((x-1)^3 - (x-1)) dx$$
$$+ \int_1^2 ((x-1) - (x-1)^3) dx$$