February 13, 2024

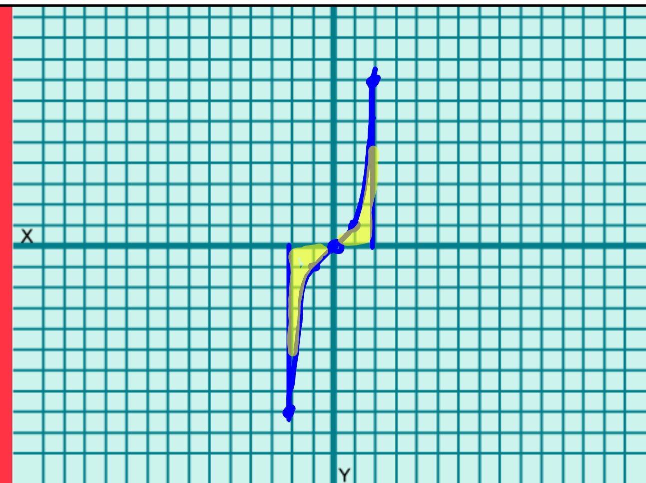
AREA 1

$f(x) = x^3 \quad [-2, 2]$

$$\int_{-2}^{2} x^3\,dx = \frac{x^4}{4}\Big|_{-2}^{2}$$

$$= 4 - 4 = 0$$

0	0
1	1
2	8



$$-\int_{-2}^{0} x^3\,dx + \int_{0}^{2} x^3\,dx$$

$$-\frac{x^4}{4}\Big|_{-2}^{0} + \frac{x^4}{4}\Big|_{0}^{2}$$

$$= 0 + {}^{+}4 + 4 - 0$$

$$= 8 \text{ units}^2$$

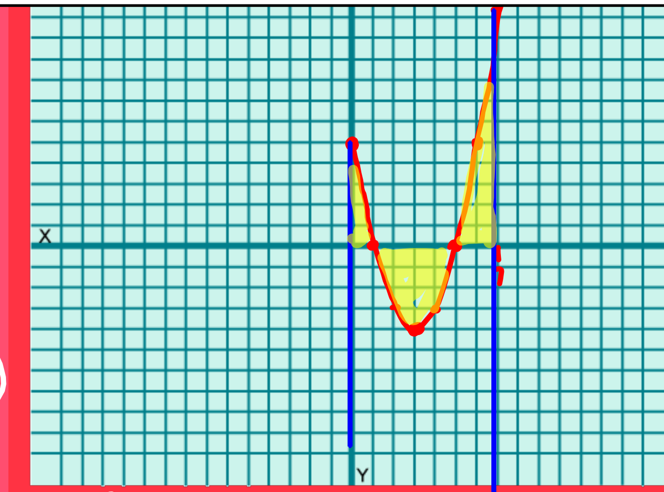
$H(x) = x^2 - 6x + 5 \ [0, 7]$

Vertex:

$$x = \frac{-b}{2a} = \frac{6}{2(1)} = 3$$

$$y = 3^2 - 6(3) + 5$$
$$= -4 \qquad (3, -4)$$

0	0
1	1
2	4
3	9



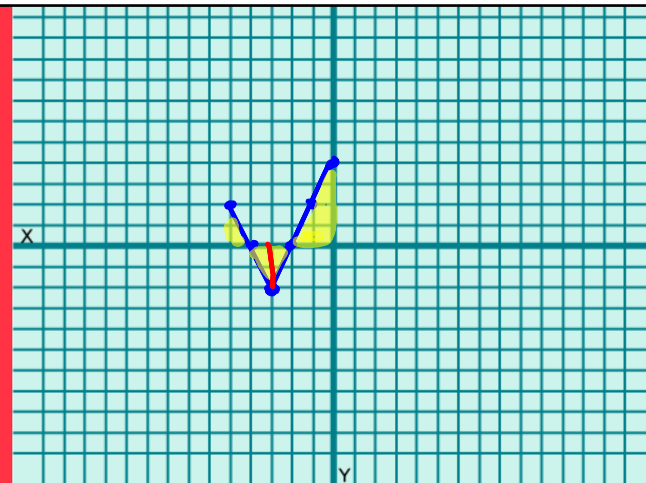
$$\int_0^1 (x^2 - 6x + 5)\,dx - \int_1^5 (x^2 - 6x + 5)\,dx + \int_5^7 (x^2 - 6x + 5)\,dx$$

$$= \frac{71}{3} \text{ units}^2$$

$f(x) = 2|x+3| - 2 \quad [-5, 0]$

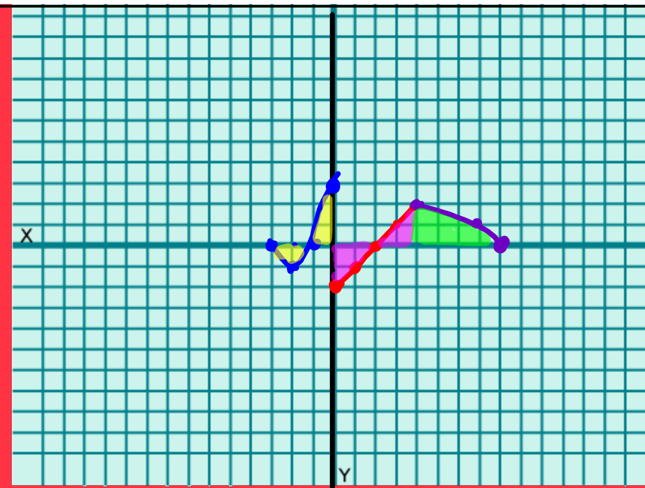
$2(x+3) - 2 = 2x+6-2$
$\qquad\qquad\quad = 2x+4$

$-2(x+3) - 2 = -2x-6-2$
$\qquad\qquad\qquad = -2x-8$



$$\int_{-5}^{-4}(-2x-8)\,dx - \int_{-4}^{-3}(-2x-8)\,dx$$
$$-\int_{-3}^{-2}(2x+4)\,dx + \int_{-2}^{0}(2x+4)\,dx = 7 \text{ units}^2$$

$$f(x) = \begin{cases} x^2+4x+3 & -3 \le x \le 0 \\ x-2 & 0 < x < 4 \\ \sqrt{8-x} & 4 \le x \le 8 \end{cases}$$



$[-3, 8]$

$\sqrt{-(x-8)}$

Right

8

0	0
1	1
4	2
9	3

$x = \frac{-4}{2(1)} = -2$

$y = 4 + -8 + 3 = -1$

$(-2, -1)$

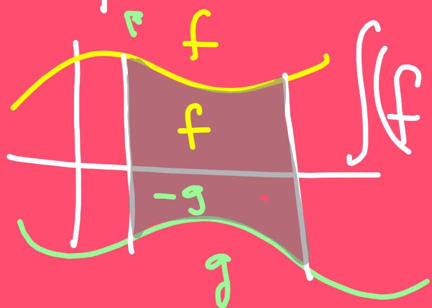
0	0
1	1
2	4

$$-\int_{-3}^{-1} (x^2+4x+3)\,dx + \int_{-1}^{0} (x^2+4x+3)\,dx$$

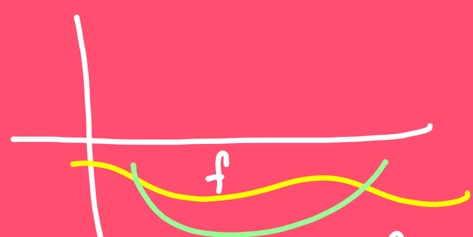
$$-\int_{0}^{2} (x-2)\,dx + \int_{2}^{4} (x-2)\,dx$$

$$+\int_{4}^{8} \sqrt{8-x}\,dx$$

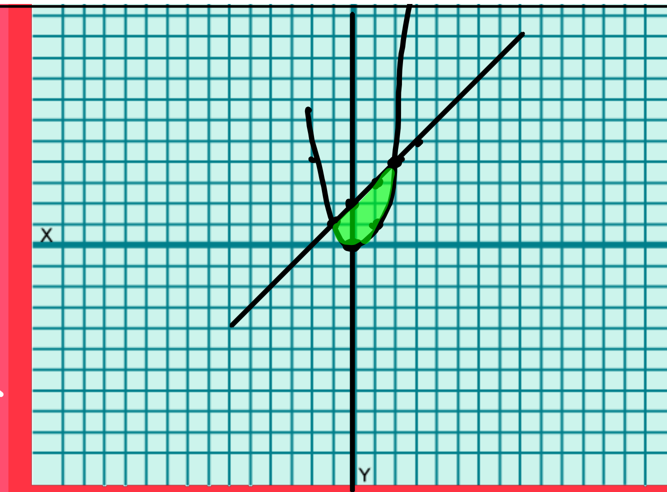
$\int (f-g)\,dx$



$\int (f-g)\,dx$



$-g - -f = \int (f-g)\,dx$



Find area between $f(x) = x+2$
and $g(x) = x^2$

$$\int_{-1}^{2} (x+2-x^2)\,dx = \frac{9}{2} \text{ units}^2$$

$$x+2 = x^2$$
$$0 = x^2 - x - 2$$
$$0 = (x-2)(x+1)$$
$$x = 2, -1$$

always top function - bottom function