February 24, 2023

Area & Volume Review

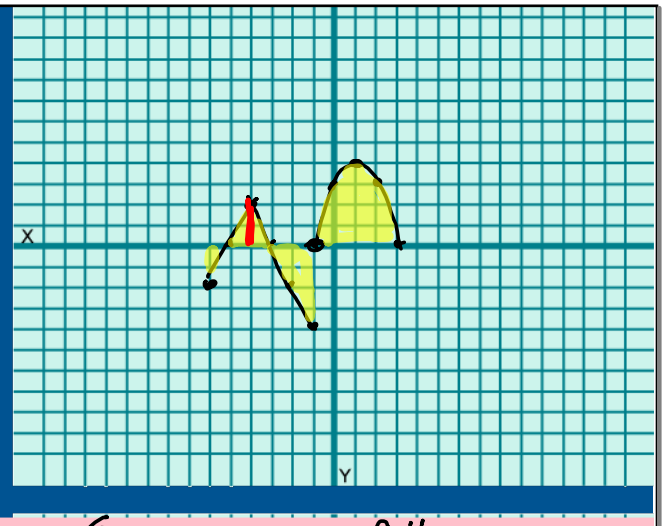
$$f(x)=\begin{cases}-2|x+4|+2 & -6\le x\le -1\\ x^2-2x+5 & -1<x\le 3\end{cases}$$

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

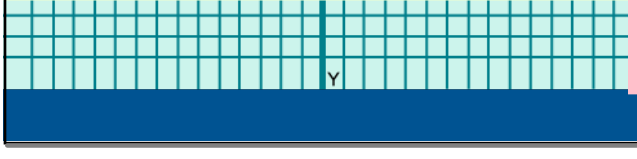
$y=1-2+5=4$

$-2(x+4)+2=-2x-8+2=-2x-6$

$2(x+4)+2=2x+8+2=2x+10$



$$-\int_{-6}^{-5}(2x+10)\,dx+\int_{-5}^{-4}(2x+10)\,dx$$
$$+\int_{-4}^{-3}(-2x-6)\,dx-\int_{-3}^{-1}(-2x-6)\,dx$$
$$+\int_{-1}^{3}(x^2-2x+5)\,dx$$



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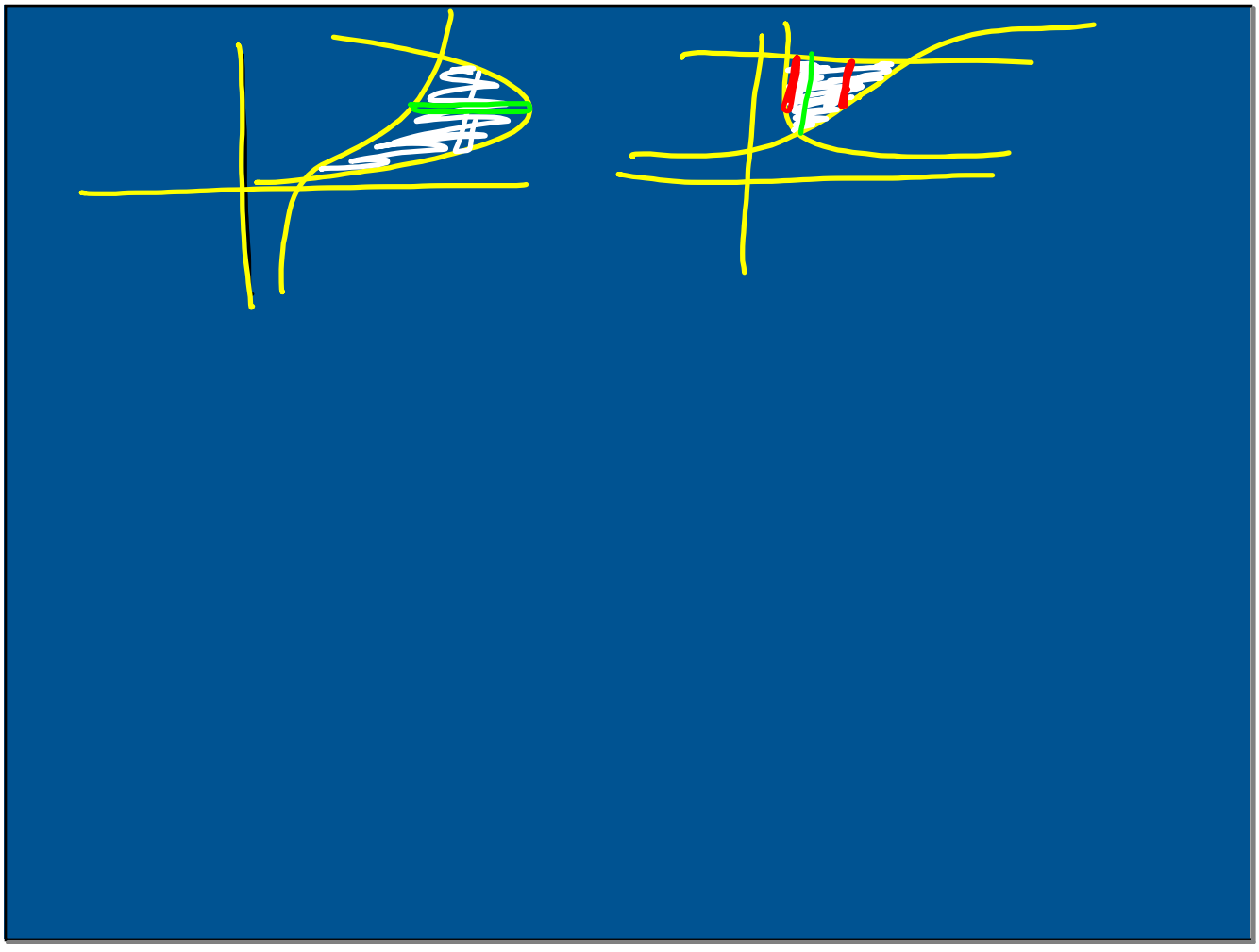
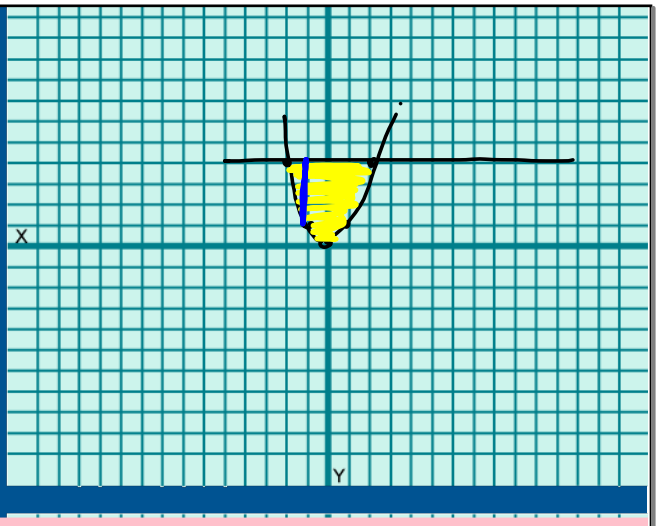


Volume by Slicing

$y = x^2$ $y = 4$



Slices:

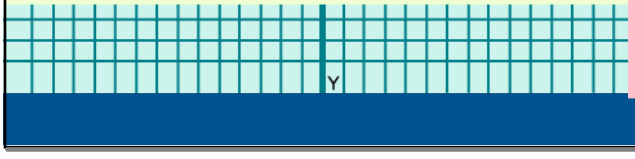
Squares $A = s^2$

Semi-circles $= \frac{\pi}{2} r^2$

Isoceles Rt Δ's: $\frac{1}{2}bh$

$A = \frac{1}{2}s^2$

Equil. Δ's $A = \frac{\sqrt{3}}{4}s^2$



Disk Method

Formula: $\pi \int_a^b (r_o^2 - r_i^2)\,dx$

Orientation of ▯: $\perp$ to axis of rev.

Shell Method

$2\pi \int_a^b r\,(f-g)\,dx$

$\parallel$ to axis of rev

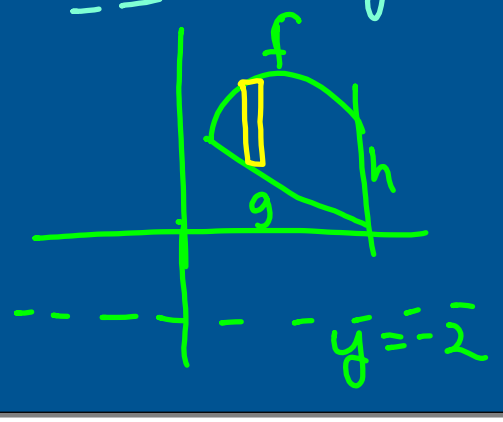
▯ is vertical $y = (x\text{'s})$

▯ is horizontal $x = (y\text{'s})$

Limits of integ.

→ use x-axis

→ use y-axis



Disk

$$\pi \int \left[(f - -2)^2 - (g - -2)^2 \right] dx$$

$$\pi \int \left[(8-g)^2 - (8-f)^2 \right]$$