March 1, 2024

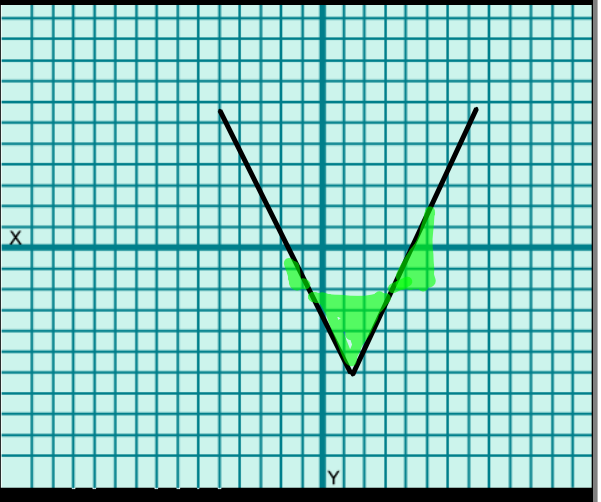
Area + Volume Review

$y = 2|x-3| - 4$

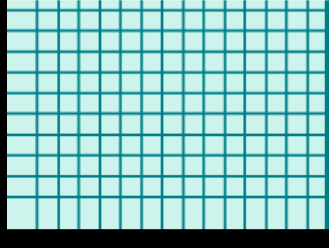
$[0, 7]$

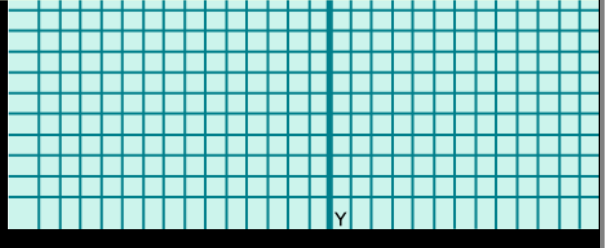
$2(x-3)-4 = 2x-6-4 = 2x-10$

$-2(x-3)-4 = -2x+6-4 = -2x+2$



$$\int_0^1 (-2x+2)\,dx - \int_1^3 (-2x+2)\,dx - \int_3^5 (2x-10)\,dx + \int_5^7 (2x-10)\,dx$$





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$x = -y^2 - 4$

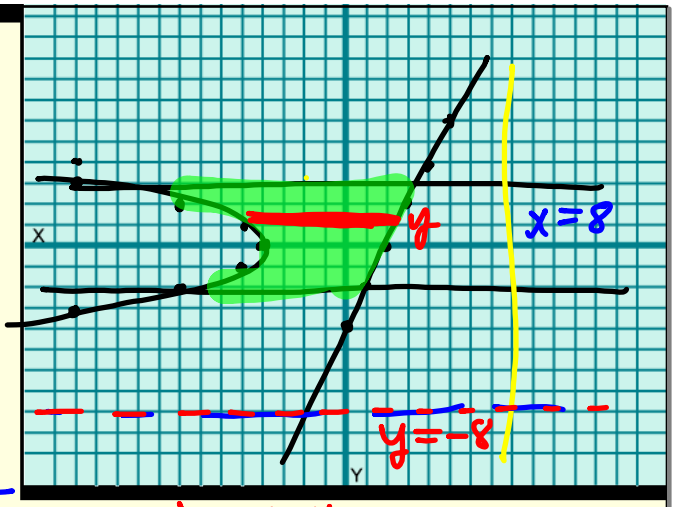
$y = 2x - 4$

$\frac{y+4}{2} = \frac{2x}{2}$

$y = -2$

$y = 3$

$$\int_{-2}^{3} \left[\frac{y+4}{2} + (+y^2+4) \right] dy$$



Disk

$x = \frac{y+4}{2}$ $\quad x = -y^2 - 4$

$$\int_{-2}^{3} \left[\left[8 - (-y^2 - 4) \right]^2 - \left[8 - \frac{y+4}{2} \right]^2 \right] dy$$

Shell

$$2\pi \int_{-2}^{3} (y-8)\left(\frac{y+4}{2} - \left(-y^2 - 4 \right) \right) dy$$

Formulas

Disk Method

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

▯ is $\perp$ to axis of rev

Shell

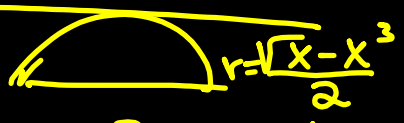
$$2\pi \int_a^b r(f-g)\,dx$$

▯ is $\parallel$ to axis

If rect is vertical, $y = x$'s

" " " horiz. $x = y$'s

Slicing



Squares	Isc rt Δ	Equilateral Δ's	Semicircles
$A = s^2$	$A = \frac{1}{2}s^2$	$A = \frac{\sqrt{3}}{4}s^2$	$\frac{\pi r^2}{2}$