7-3 Day 3 Volumes : Cylindrical Shells Method

Learning Targets

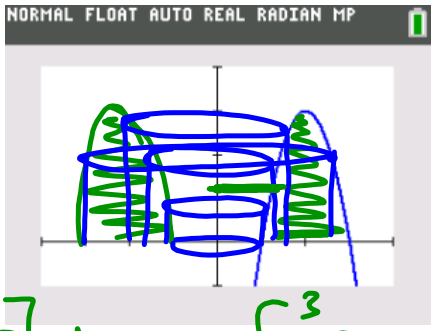
I can find the volume of a solid that has been rotated around an axis using the cylindrical shells method.

Jan 7-8:45 AM

https://www.youtube.com/watch?v=3B2YQbEzshg

Jan 31-10:26 PM

Ex1. The region bounded by the curve $y = -3(x-2)^2 + 3$ and the x-axis is revolved around the y-axis. Find the volume.



$2\pi rh$

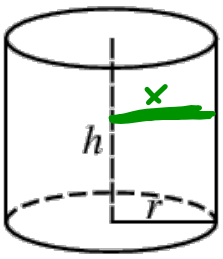
$$\int_a^b 2\pi x\, f(x)\, dx$$

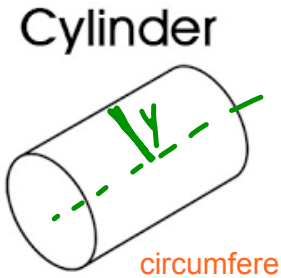
$$\int_1^3 2\pi x\left[-3(x-2)^2+3\right]dx = \int_1^3 2\pi x \cdot Y_1\, dx$$

$$= 50.265 \text{ units}^3$$

Cylindrical Shells is another method to use to find the volume.

rotation about	**y-axis or x = a#**	**x-axis or y = a #**
functions in the form	**y = f(x)**	**x=g(y)**
radius	**in terms of x**	**in terms of y**
cylinder	**vertical**	**horizontal**





integral

circumference

$$\int_a^b 2\pi x f(x)\,dx$$

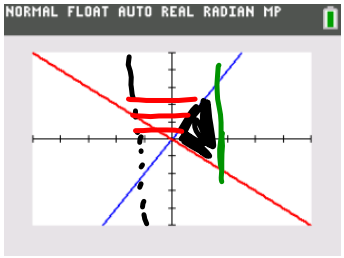
radius height thickness

circumference

$$\int_a^b 2\pi y g(y)\,dy$$

radius height thickness

Ex2. The region bounded by the curves $y = 2x$, $y = -x$ and $x = 2$ is rotated around the line $x = -1$. Find the volume.



$r = x + 1$

$h = 2x - (-x)$

$= 3x$

$$\int_0^2 2\pi (x+1)(3x)\,dx$$

$$= 2\pi \int_0^2 (3x^2+3x)\,dx = 87.965 \text{ units}^3$$

Homework

p. 406 #26-28, 31-38, 45-46

Jan 7-8:45 AM