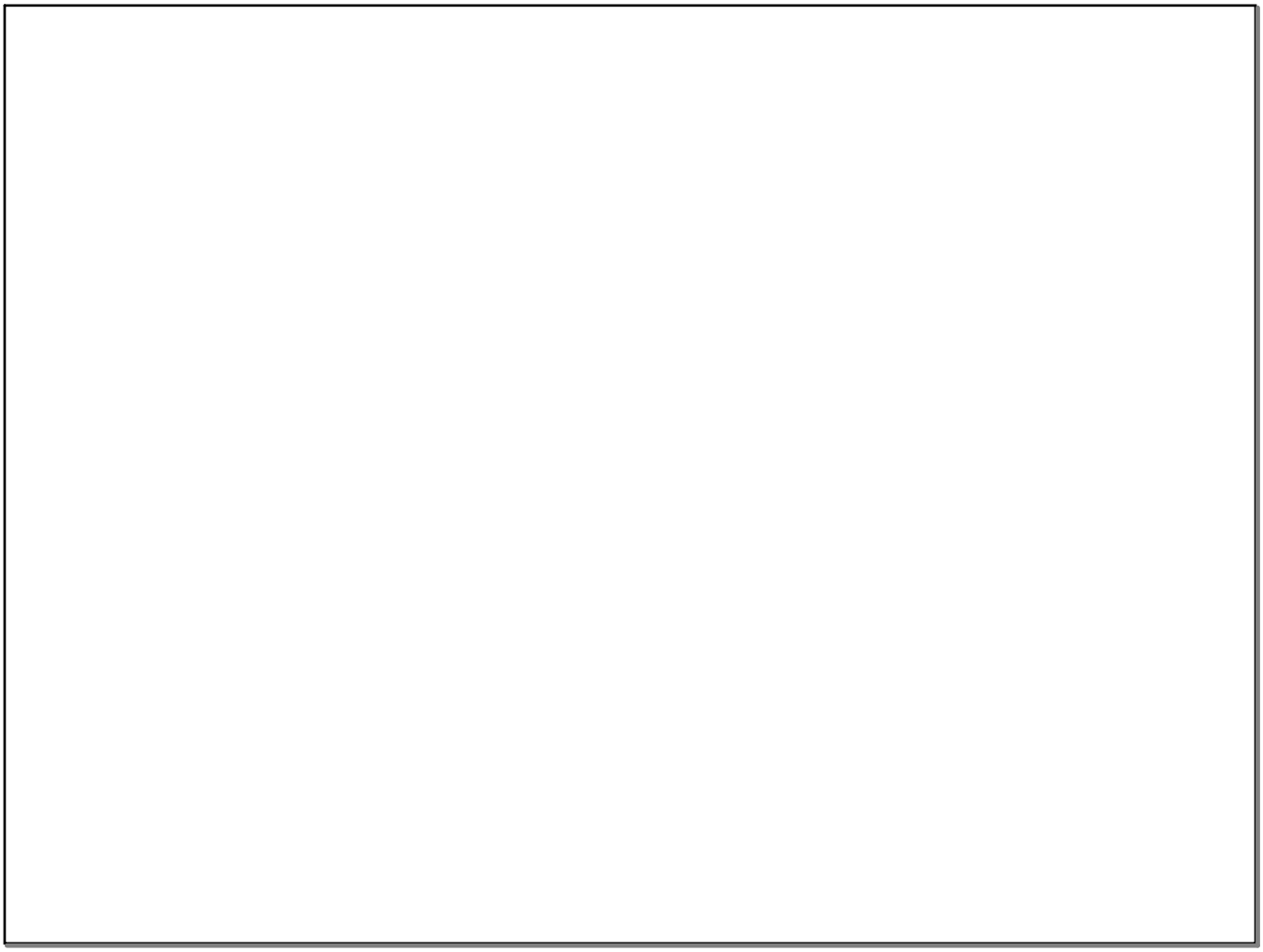


Jan 27-10:53 AM

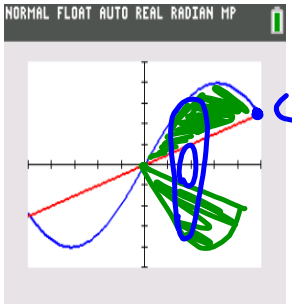
7-3 Day 2 Volumes : Washers Method

Learning Targets

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

Jan 7-8:41 AM

Ex1. The region in the first quadrant enclosed by the graphs of $f(x) = 4\sin\left(\frac{x}{2}\right)$ and $g(x) = \frac{x}{2}$ is revolved around the x-axis to form a solid. Find the volume.



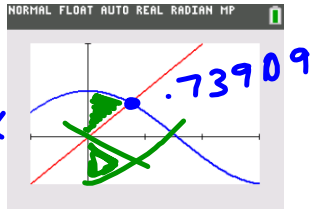
$$\pi\int_0^{4.9491}\left(\left(4\sin\left(\frac{x}{2}\right)\right)^2 - \left(\frac{x}{2}\right)^2\right)dx$$

$$\pi\int_0^{4.9491}\left(\left(f(x)\right)^2 - \left(g(x)\right)^2\right)dx$$

$$= 117.081 \text{ units}^3$$

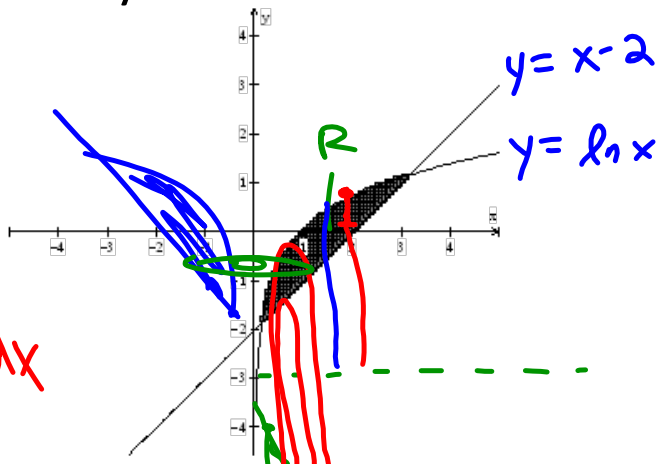
Ex2. The region in the first quadrant enclosed by the y-axis and the graphs of $y = \cos x$ and $y = x$ is revolved around the x-axis to form a solid. Find the volume.

$$\int_0^{.73909} \pi\left((\cos x)^2 - x^2\right)dx$$



1.520

Ex3. Let R be the shaded region bounded by the graph of y = ln x and the line y = x – 2 as shown.



a.) Find the area of R.

$$\int_{0.158594}^{3.1461932} [\ln(x) - (x-2)]\,dx$$

1.949 u²

b.) Find the volume of the solid when R is rotated around the horizontal line y = -3.

$$\int_{.158594}^{3.1461932} \pi\left((3+\ln x)^2 - (x+1)^2\right)dx$$

$R = 3 + \ln x$

$r = x - 2 + 3 = x + 1$

$= 34.198 \text{ units}^3$

c.) Find the volume of the solid when R is rotated around the y-axis.

$y = \ln x$ $\quad x = e^y$

$y = x - 2$ $\quad x = y + 2$

$$\int_{-1.8414}^{1.1462} \pi\left[(y+2)^2 - (e^y)^2\right]dy$$

$= 17.099 \text{ units}^3$

Homework

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Jan 7-8:42 AM