8.10 Disc Method: Revolve Around Other Axes

Calculus

Solutions

Practice

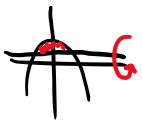
Setup the integral that gives the volume of the solid formed from revolving the bounded region about the given line. Set up the integral, but do not evaluate.

1. $y = 2 - x^2$ and $y = 1$ revolved about the line $y = 1$.

$2 - x^2 = 1$

$x^2 = 1$

$x = \pm 1$

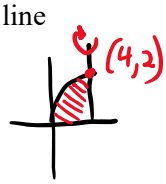


$$\int_{-1}^{1} \pi (2 - x^2 - 1)^2 \, dx$$

$$\pi \int_{-1}^{1} (1 - x^2)^2 \, dx$$

2. $y = \sqrt{x}$, $y = 0$, $x = 4$ and revolve about the line $x = 4$.

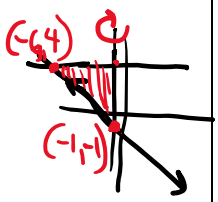
$x = y^2$



$$\int_{0}^{2} \pi (4 - y^2)^2 \, dy$$

3. $y = -x - 2$, $y = 4$, $x = -1$ and revolve about the line $x = -1$.

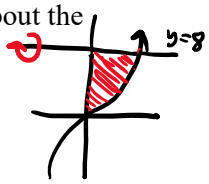
$x = -y - 2$



$$\int_{-1}^{4} \pi (-y - 2 - (-1))^2 \, dy$$

$$\pi \int_{-1}^{4} (-y - 1)^2 \, dy$$

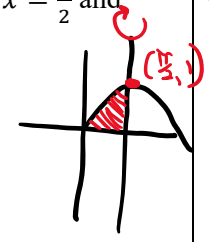
4. $y = x^3$, $x = 0$, and $y = 8$ and revolve about the line $y = 8$.



$$\int_{0}^{2} \pi (8 - x^3)^2 \, dx$$

5. First quadrant, $y = \sin x$, $y = 0$ and $x = \frac{\pi}{2}$ and revolve about the line $x = \frac{\pi}{2}$.

$x = \sin^{-1}(y)$



$$\int_{0}^{1} \pi \left(\frac{\pi}{2} - \sin^{-1}(y)\right)^2 \, dy$$

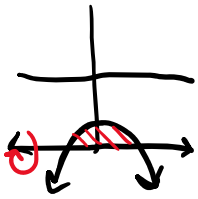
6. $y = -x^2 - 2$ and $y = -3$ and revolve about the line $y = -3$.

$-x^2 - 2 = -3$

$-x^2 = -1$

$x^2 = 1$

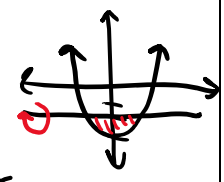
$x = \pm 1$



$$\int_{-1}^{1} \pi (-3 - (-x^2 - 2))^2 \, dx$$

$$\pi \int_{-1}^{1} (x^2 - 1)^2 \, dx$$

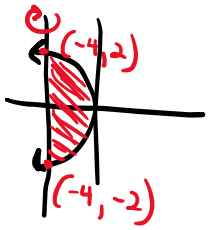
7. $y = x^2 - 3$ and $y = -2$ and revolve about the line $y = -2$.



$$\int_{-1}^{1} \pi (x^2 - 3 - (-2))^2 \, dx$$

$$\pi \int_{-1}^{1} (x^2 - 1)^2 \, dx$$

8. $x = -y^2$, $x = -4$ and revolve about the line $x = -4$.



$$\int_{-2}^{2} \pi (-4 - -y^2)^2 \, dy$$

$$\pi \int_{-2}^{2} (y^2 - 4)^2 \, dy$$

No test prep for this lesson.