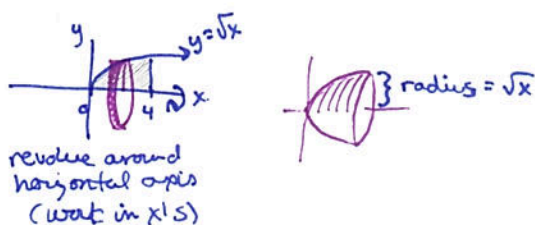


Volume Using the Disk Method

Find the volume of the solid described in each.

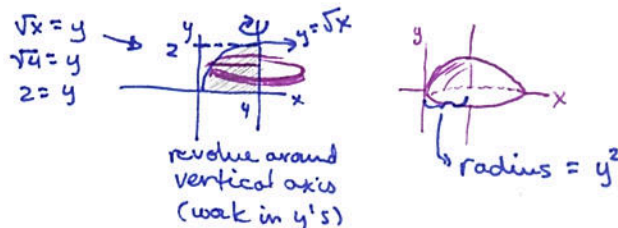
1. $y = \sqrt{x}$, $x = 0$, $x = 4$, revolve about the x -axis

$$\begin{aligned} V &= \pi \int_0^4 (\sqrt{x})^2 dx \\ &= \pi \int_0^4 x dx \\ &= \pi \left(\frac{1}{2} x^2 \right) \Big|_0^4 = \boxed{8\pi} \end{aligned}$$



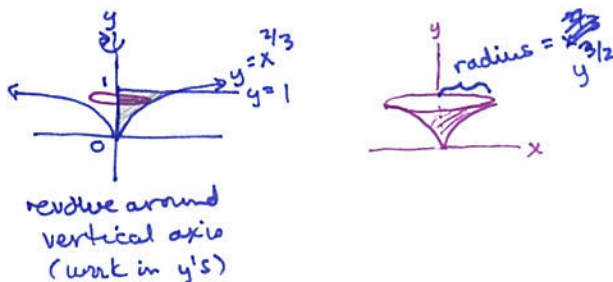
2. $y = \sqrt{x}$, $x = 0$, $x = 4$, revolve about $x = 4$
 $y^2 = x$

$$\begin{aligned} V &= \pi \int_0^2 (y^2)^2 dy \\ &= \pi \int_0^2 y^4 dy \\ &= \pi \left(\frac{1}{5} y^5 \right) \Big|_0^2 \\ &= \boxed{\frac{32}{5} \pi} \end{aligned}$$



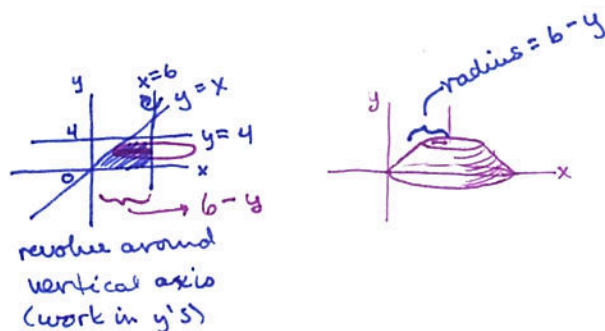
3. $y = x^{2/3}$, $x = 0$, $y = 1$, revolve about the y -axis

$$\begin{aligned} y^{3/2} &= x \\ y^{3/2} &= x \\ V &= \pi \int_0^1 (y^{3/2})^2 dy \\ &= \pi \int_0^1 y^3 dy \\ &= \pi \left(\frac{1}{4} y^4 \right) \Big|_0^1 = \boxed{\frac{1}{4} \pi} \end{aligned}$$



4. $y = x$, $y = 0$, $y = 4$, $x = 6$, revolve about $x = 6$

$$\begin{aligned} V &= \pi \int_0^4 (6 - y)^2 dy \\ &= \pi \int_0^4 (36 - 12y + y^2) dy \\ &= \pi \left(36y - 6y^2 + \frac{1}{3} y^3 \right) \Big|_0^4 \\ &= \pi \left(144 - 96 + \frac{64}{3} \right) = \boxed{\frac{208}{3} \pi} \end{aligned}$$



5. $y = \frac{1}{\sqrt{x+1}}$, $y = 0$, $x = 0$, $x = 3$, revolve about the x -axis

$$\begin{aligned} V &= \pi \int_0^3 \left(\frac{1}{\sqrt{x+1}} \right)^2 dx \\ &= \pi \int_0^3 \frac{1}{x+1} dx \\ &= \pi \ln|x+1| \Big|_0^3 \\ &= \pi (\ln 4 - \ln 1) \\ &= \boxed{\pi \ln 4} \end{aligned}$$

u = x+1, du = dx ... ☺

