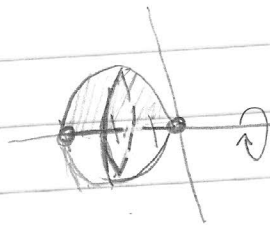


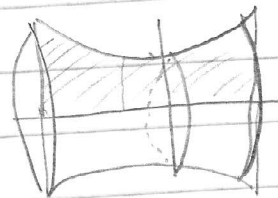
Volume Assignment

① $y = -3x - x^2$, $y=0$
 $y = x(-3-x)$
 $x=0$ $x=-3$



$$\begin{aligned} V &= \pi \int_{-3}^0 (-3x - x^2)^2 dx = \pi \int_{-3}^0 (9x^2 + 6x^3 + x^4) dx \\ &= \pi \left[3x^3 + \frac{3}{2}x^4 + \frac{1}{5}x^5 \right]_{-3}^0 \\ &= \pi \left[0 - \left(3(-3)^3 + \frac{3}{2}(-3)^4 + \frac{1}{5}(-3)^5 \right) \right] \\ &= \pi \left[81 - \frac{243}{2} + \frac{243}{5} \right] = \frac{81}{10}\pi \approx 25.4469 \end{aligned}$$

② $y = \sec x$ $x = -\frac{\pi}{4}, \frac{\pi}{4}$, $y=0$



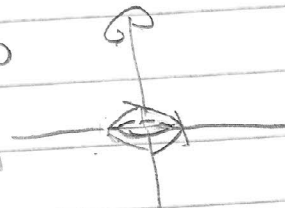
$$\begin{aligned} V &= 2\pi \int_0^{\pi/4} (\sec x)^2 dx = 2\pi [\tan x]_0^{\pi/4} \\ &= 2\pi (\tan \pi/4 - \tan 0) \\ &= 2\pi \approx 6.2831 \end{aligned}$$

③ $x = 1 - y^2$, $x=0$

$$1 - y^2 = 0$$

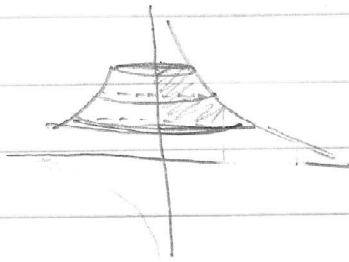
$$y^2 = 1$$

$$y = \pm 1$$



$$\begin{aligned} V &= 2\pi \int_0^1 (1 - y^2)^2 dy \\ &= 2\pi \int_0^1 (1 - 2y^2 + y^4) dy \\ &= 2\pi \left[y - \frac{2}{3}y^3 + \frac{1}{5}y^5 \right]_0^1 = 2\pi \left[1 - \frac{2}{3} + \frac{1}{5} \right] = \frac{16}{15}\pi \\ &\approx 3.3510 \end{aligned}$$

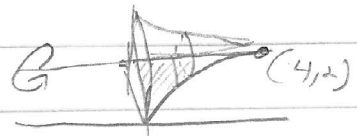
④ $xy=1$ $x=0, y=1, y=2$
 $x=1/y$



$$V = \pi \int_1^2 \left(\frac{1}{y}\right)^2 dy = \pi \int_1^2 y^{-2} dy$$

$$= \pi \left[\frac{y^{-1}}{-1} \right]_1^2 = \pi \left[-\frac{1}{y} \right]_1^2 = \pi \left(-\frac{1}{2} + \frac{1}{1} \right) = \frac{\pi}{2} \approx 1.5707$$

⑤ $y=\sqrt{x}$ $y=2, x=0$ $y=2$
 $x=y^2$

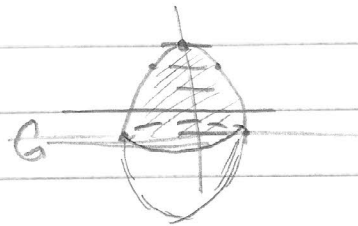


$$V = \pi \int_0^4 (2 - \sqrt{x})^2 dx = \pi \int_0^4 (4 - 4\sqrt{x} + x) dx$$

$$= \pi \left[4x - \frac{8}{3}x^{3/2} + \frac{1}{2}x^2 \right]_0^4 = \pi \left[16 - \frac{64}{3} + 8 \right]$$

$$= \frac{8\pi}{3} \approx 8.3775$$

⑥ $y=3-x^2$, $y=-1$



$$V = 2\pi \int_0^2 (3-x^2 - (-1))^2 dx$$

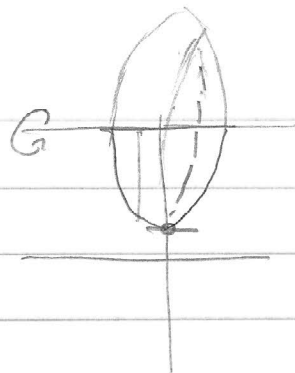
$$= 2\pi \int_0^2 (4-x^2)^2 dx = 2\pi \int_0^2 (16 - 8x^2 + x^4) dx$$

$$= 2\pi \left[16x - \frac{8}{3}x^3 + \frac{1}{5}x^5 \right]_0^2 = 2\pi \left[32 - \frac{64}{3} + \frac{32}{5} \right]$$

$$= \frac{512}{15}\pi \approx 107.2330$$

⑦ $y = 3x^2 + 1$, $y = 4$

$$\begin{aligned} 3x^2 + 1 &= 4 \\ 3x^2 &= 3 \\ x^2 &= 1 \\ x &= \pm 1 \end{aligned}$$

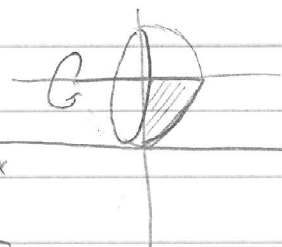


$$V = 2\pi \int_0^1 (4 - (3x^2 + 1))^2 dx$$

$$= 2\pi \int_0^1 (3 - 3x^2)^2 dx = 2\pi \int_0^1 (9 - 18x^2 + 9x^4) dx$$

$$= 2\pi \left[9x - 6x^3 + \frac{9}{5}x^5 \right]_0^1 = 2\pi \left[9 - 6 + \frac{9}{5} \right] = \frac{48}{5}\pi \approx 30,1592$$

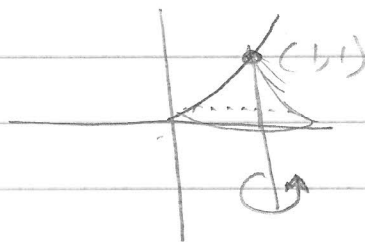
⑧ $y = x^2$, $y = 1$, y-axis , $y = 1$



$$V = \pi \int_0^1 (1 - x^2)^2 dx = \pi \int_0^1 (1 - 2x^2 + x^4) dx$$

$$= \pi \left[x - \frac{2}{3}x^3 + \frac{1}{5}x^5 \right]_0^1 = \pi \left[1 - \frac{2}{3} + \frac{1}{5} \right] = \frac{8\pi}{15} \approx 1,6755$$

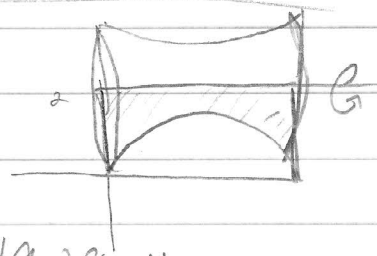
⑨ $y = x^{3/2}$, $x = 1$



$$V = \pi \int_0^1 (1 - y^{2/3})^2 dy$$

$$= ,22857\pi \approx ,7180$$

⑩ $y = \sin x$, $x = 0, \pi$, $y = 2$



$$V = \pi \int_0^\pi (2 - \sin x)^2 dx$$

$$= 6,1371\pi \approx 19,2804$$

