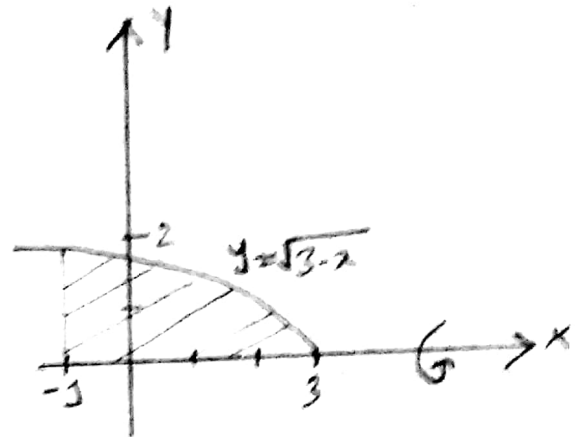
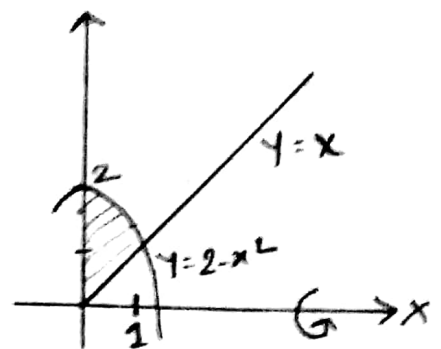


Exercise 6.2

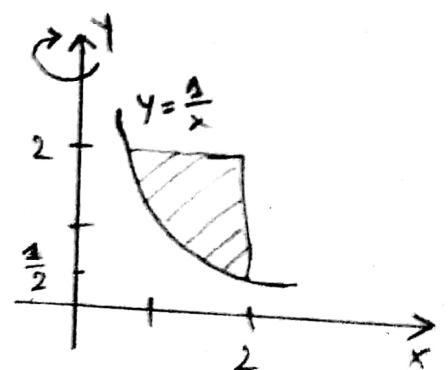
$$\begin{aligned}
 1. \quad V &= \pi \int_{-1}^3 [(\sqrt{3-x})^2 - 0^2] dx \\
 &= \pi \int_{-1}^3 (3-x) dx \\
 &= \pi \left[3x - \frac{x^2}{2} \right]_{-1}^3 = 8\pi
 \end{aligned}$$



$$\begin{aligned}
 2. \quad V &= \pi \int_0^1 [(2-x)^2 - x^2] dx \\
 &= \pi \int_0^1 (4 - 4x + x^2 - x^2) dx \\
 &= \pi \left[4x - \frac{4x^2}{2} + \frac{x^3}{3} - \frac{x^3}{3} \right]_0^1 = \frac{38\pi}{15}
 \end{aligned}$$



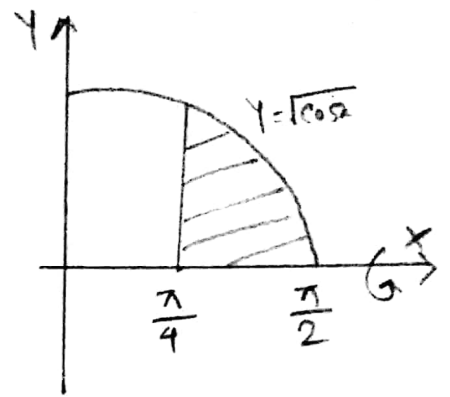
$$\begin{aligned}
 4. \quad V &= \pi \int_{\frac{1}{2}}^2 \left[2^2 - \frac{1}{y^2} \right] dy \quad \left| \begin{array}{l} x=2 \\ y=\frac{1}{y} \\ \text{Limit: } y=2 \\ y=\frac{1}{2} \end{array} \right. \\
 &= \pi \left[4y + y^{-1} \right]_{\frac{1}{2}}^2 \\
 &= \frac{9\pi}{2}
 \end{aligned}$$



5.

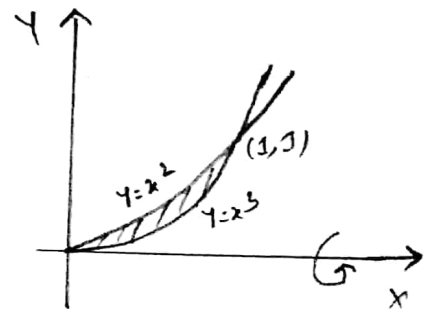
$$V = \pi \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} [(\sqrt{\cos x})^2 - 0^2] dx$$

$$= \pi [\sin x]_{\frac{\pi}{4}}^{\frac{\pi}{2}} = 0.92$$



$$6. V = \pi \int_0^1 [(x^2)^2 - (x^3)^2] dx$$

$$= \pi \left[\frac{x^5}{5} - \frac{x^7}{7} \right]_0^1 = \frac{2\pi}{35}$$



$$7. V = \pi \int_{-1}^3 [(\sqrt{1+y})^2 - 0^2] dy$$

$$= \pi \int_{-1}^3 (1+y) dy$$

$$= \pi \left[y + \frac{y^2}{2} \right]_{-1}^3$$

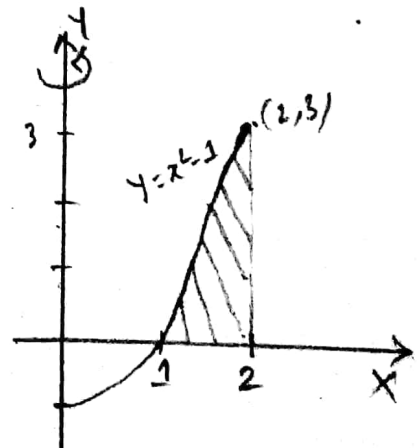
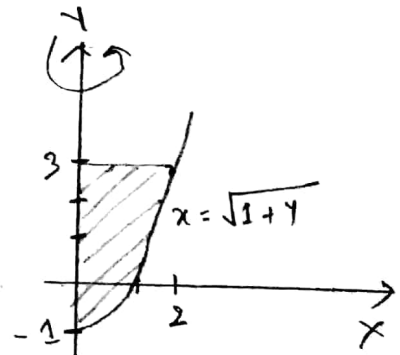
$$= 8\pi$$

$$8. V = \pi \int_0^3 [2^2 - (\sqrt{y+1})^2] dy$$

$$= \pi \int_0^3 (4 - y - 1) dy$$

$$= \pi \left[4y - \frac{y^2}{2} - y \right]_0^3$$

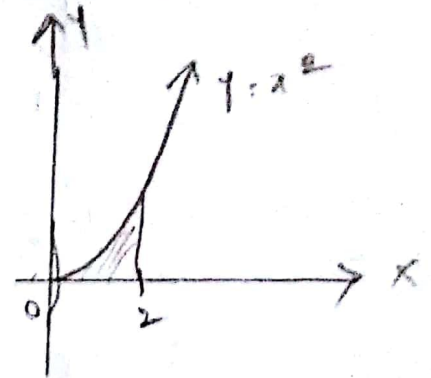
$$= \frac{9\pi}{2}$$



9. $y = x^2$ and the x -axis, $y=0$ from $x=0$ to $x=2$

$$V = \pi \int_0^2 [(x^2)^2 - 0^2] dx$$

$$= \pi \left[\frac{x^5}{5} \right]_0^2 = \frac{32\pi}{5}$$



13. $x = \sqrt{y}$, $x = y/4$

$$\sqrt{y} = \frac{y}{4}$$

$$\Rightarrow y = \frac{y^2}{16}$$

$$\Rightarrow y^2 - 16y = 0$$

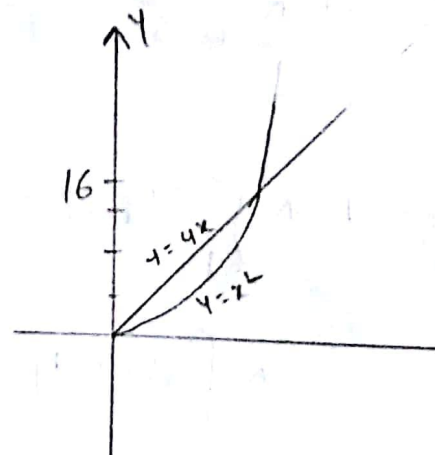
$$\Rightarrow y(y - 16) = 0$$

$$\Rightarrow y = 0, 16$$

$$V = \pi \int_0^{16} \left[(\sqrt{y})^2 - \left(\frac{y}{4}\right)^2 \right] dy$$

$$= \pi \left[\frac{y^2}{2} - \frac{y^3}{12} \right]_0^{16}$$

$$= \frac{2048\pi}{15}$$

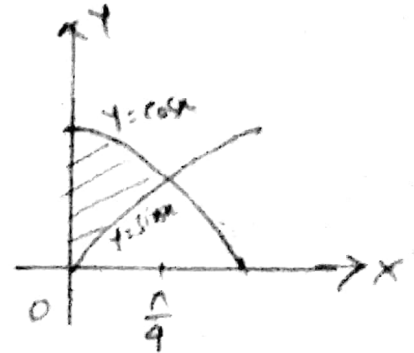


14. $y = \sin x$, $y = \cos x$, $x = 0$, $x = \frac{\pi}{4}$

$$V = \pi \int_0^{\frac{\pi}{4}} [\cos^2 x - \sin^2 x] dx$$

$$= \pi \int_0^{\frac{\pi}{4}} \cos 2x dx$$

$$= \pi \left[\frac{\sin 2x}{2} \right]_0^{\frac{\pi}{4}} = \frac{\pi}{2}$$



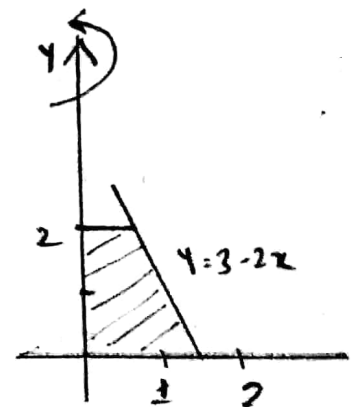
15. $y = e^x$, $y = 0$, $x = 0$, $x = \ln 3$

$$V = \pi \int_0^{\ln 3} [(e^x)^2 - 0^2] dx = \pi \left[\frac{e^{2x}}{2} \right]_0^{\ln 3} = 4\pi$$

3. $V = \pi \int_0^2 \left[\left(\frac{1}{2} (3-y) \right)^2 - 0 \right] dy$

$$= \pi \int_0^2 \left[\frac{1}{4} (3-y)^2 \right] dy$$

$$= \frac{13\pi}{6}$$

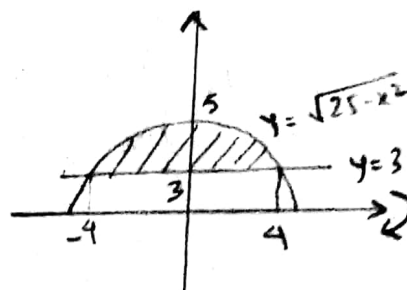


11. $y = \sqrt{25-x^2}$, $y = 3$ revolved about x axis

$$y = \sqrt{25-3^2} = \sqrt{25-9} = \sqrt{16} = \pm 4$$

$$V = \pi \int_{-4}^4 [(\sqrt{25-x^2})^2 - 3^2] dx$$

$$= \pi \int_{-4}^4 (16 - x^2) dx = \pi \left[16x - \frac{x^3}{3} \right]_{-4}^4 = \frac{256\pi}{3}$$



12. $y = 9-x^2$, $y = 0$ revolved about x axis

$$0 = 9 - x^2$$

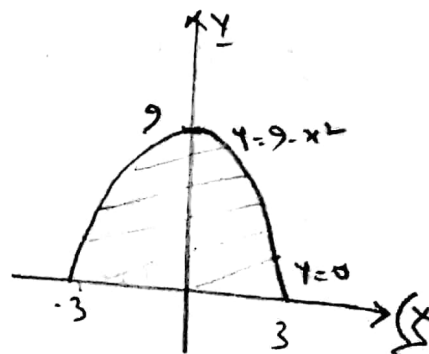
$$\Rightarrow x^2 = 9$$

$$\Rightarrow x = 3, -3$$

$$V = \pi \int_{-3}^3 [(9-x^2)^2 - 0^2] dx$$

$$= \pi \int_{-3}^3 (81 - 18x^2 + x^4) dx$$

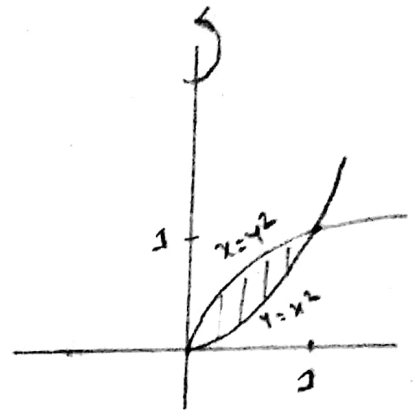
$$= \frac{1296\pi}{5}$$



22. $y = x^2$, $x = y^2$ revolved about y axis

$$V = \pi \int_0^1 [(\sqrt{y})^2 - (y^2)^2] dy$$

$$= \pi \int_0^1 (y - y^4) dy = \frac{3\pi}{10}$$



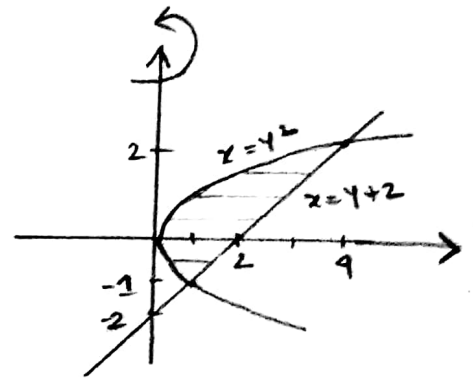
23. $x = y^2$, $x = y + 2$ revolved about y axis

$$y^2 = y + 2$$

$$\Rightarrow y^2 - y - 2 = 0$$

$$\Rightarrow (y - 2)(y + 1) = 0 \Rightarrow y = -1, 2$$

$$V = \pi \int_{-1}^2 [(y+2)^2 - (y^2)^2] dy = \frac{72\pi}{5}$$

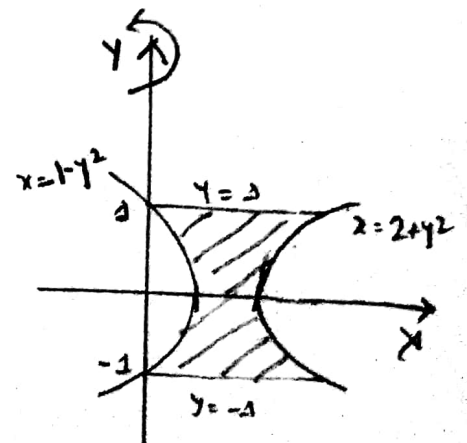


24. $x = 1 - y^2$, $x = 2 + y^2$, $y = -1$, $y = 1$

(revolved about y axis)

$$V = \pi \int_{-1}^1 [(2 + y^2)^2 - (1 - y^2)^2] dy$$

$$= \pi \int_{-1}^1 (3 + 6y^2) dy = 10\pi$$



25. $y = \ln x$, $x = 0$, $y = 0$, $y = 1$ revolved about y axis

$$V = \pi \int_0^1 [(e^y)^2 - 0^2] dy$$

$$= \pi \left[\frac{e^{2y}}{2} \right]_0^1 = \frac{\pi}{2} (e^2 - 1)$$

