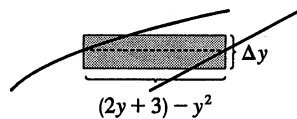
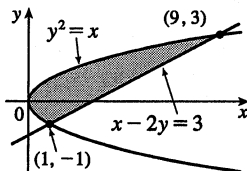


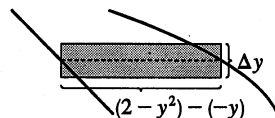
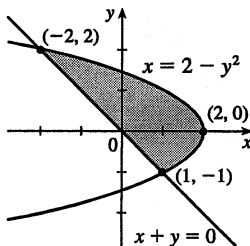
11. The curves intersect when $y^2 = 2y + 3 \Leftrightarrow y^2 - 2y - 3 = 0 \Leftrightarrow (y - 3)(y + 1) = 0 \Leftrightarrow y = -1, 3$.

$$\begin{aligned} A &= \int_{-1}^3 [(2y + 3) - y^2] dy \\ &= [y^2 + 3y - \frac{1}{3}y^3]_{-1}^3 \\ &= (9 + 9 - 9) - (1 - 3 + \frac{1}{3}) \\ &= \frac{32}{3} \end{aligned}$$



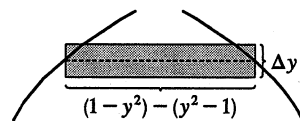
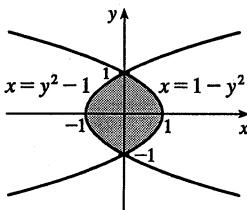
12. $A = \int_{-1}^2 [(2 - y^2) - (-y)] dy$

$$\begin{aligned} &= \int_{-1}^2 (-y^2 + y + 2) dy \\ &= [-\frac{1}{3}y^3 + \frac{1}{2}y^2 + 2y]_{-1}^2 \\ &= (-\frac{8}{3} + 2 + 4) - (-\frac{1}{3} + \frac{1}{2} - 2) = \frac{9}{2} \end{aligned}$$



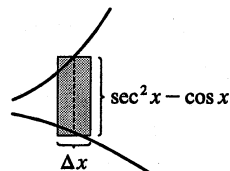
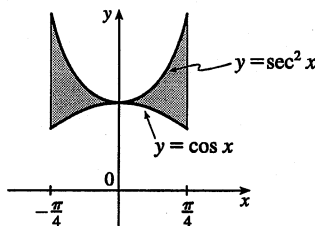
13. The curves intersect when $1 - y^2 = y^2 - 1 \Leftrightarrow 2 = 2y^2 \Leftrightarrow y^2 = 1 \Leftrightarrow y = \pm 1$.

$$\begin{aligned} A &= \int_{-1}^1 [(1 - y^2) - (y^2 - 1)] dy \\ &= \int_{-1}^1 2(1 - y^2) dy \\ &= 2 \cdot 2 \int_0^1 (1 - y^2) dy \\ &= 4[y - \frac{1}{3}y^3]_0^1 = 4(1 - \frac{1}{3}) = \frac{8}{3} \end{aligned}$$



14. $A = \int_{-\pi/4}^{\pi/4} (\sec^2 x - \cos x) dx$

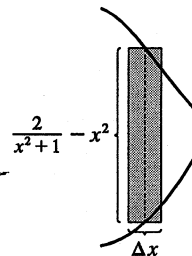
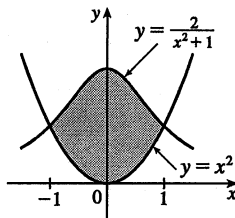
$$\begin{aligned} &= 2 \int_0^{\pi/4} (\sec^2 x - \cos x) dx \\ &= 2[\tan x - \sin x]_0^{\pi/4} \\ &= 2(1 - \frac{1}{\sqrt{2}}) = 2 - \sqrt{2} \approx 0.59 \end{aligned}$$



15. The curves intersect when $x^2 = \frac{2}{x^2 + 1} \Leftrightarrow x^4 + x^2 = 2 \Leftrightarrow x^4 + x^2 - 2 = 0 \Leftrightarrow$

$$(x^2 + 2)(x^2 - 1) = 0 \Leftrightarrow x^2 = 1 \Leftrightarrow x = \pm 1.$$

$$\begin{aligned} A &= \int_{-1}^1 \left(\frac{2}{x^2 + 1} - x^2 \right) dx \\ &= 2 \int_0^1 \left(\frac{2}{x^2 + 1} - x^2 \right) dx \\ &= 2 \left[2 \tan^{-1} x - \frac{1}{3}x^3 \right]_0^1 = 2 \left(2 \cdot \frac{\pi}{4} - \frac{1}{3} \right) \\ &= \pi - \frac{2}{3} \approx 2.47 \end{aligned}$$



16. For $x > 0$, $x = x^2 - 2 \Rightarrow 0 = x^2 - x - 2 \Rightarrow 0 = (x - 2)(x + 1) \Rightarrow x = 2$. By symmetry,

$$\begin{aligned}\int_{-2}^2 [|x| - (x^2 - 2)] dx &= 2 \int_0^2 [x - (x^2 - 2)] dx = 2 \int_0^2 (x - x^2 + 2) dx = 2 \left[\frac{1}{2}x^2 - \frac{1}{3}x^3 + 2x \right]_0^2 \\ &= 2 \left(2 - \frac{8}{3} + 4 \right) = \frac{20}{3}\end{aligned}$$

