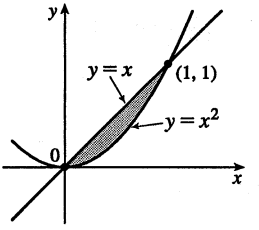
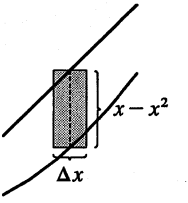
7. The curves intersect when $x = x^2 \Rightarrow x^2 - x = 0 \Leftrightarrow x(x-1) = 0 \Leftrightarrow x = 0, 1$.

$$\begin{aligned} A &= \int_0^1 (x - x^2)\,dx \\ &= \left[\tfrac{1}{2}x^2 - \tfrac{1}{3}x^3\right]_0^1 \\ &= \tfrac{1}{2} - \tfrac{1}{3} \\ &= \tfrac{1}{6} \end{aligned}$$

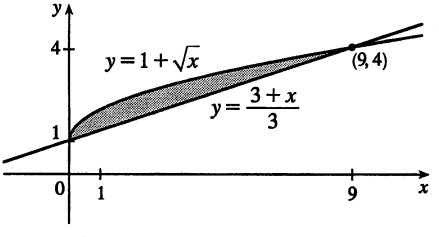


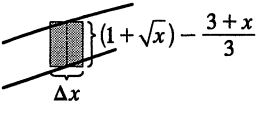


8. $1 + \sqrt{x} = \dfrac{3+x}{3} = 1 + \dfrac{x}{3} \Rightarrow \sqrt{x} = \dfrac{x}{3} \Rightarrow x = \dfrac{x^2}{9} \Rightarrow 9x - x^2 = 0 \Rightarrow x(9-x) = 0 \Rightarrow x = 0$ or 9, so

$$A = \int_0^9 \left[\left(1+\sqrt{x}\right) - \left(\frac{3+x}{3}\right)\right] dx = \int_0^9 \left[\left(1+\sqrt{x}\right) - \left(1+\frac{x}{3}\right)\right] dx$$

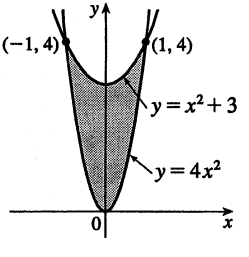
$$= \int_0^9 \left(\sqrt{x} - \tfrac{1}{3}x\right) dx = \left[\tfrac{2}{3}x^{3/2} - \tfrac{1}{6}x^2\right]_0^9 = 18 - \tfrac{27}{2} = \tfrac{9}{2}$$

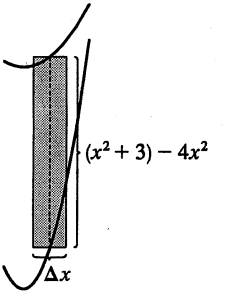




9. The curves intersect when $4x^2 = x^2 + 3 \Leftrightarrow 3x^2 = 3 \Leftrightarrow x^2 = 1 \Leftrightarrow x = \pm 1$.

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





10. $A = \int_{-1}^1 \left[(1-x^2) - (x^4 - x^2)\right] dx = 2\int_0^1 (1 - x^4)\,dx = 2\left[x - \tfrac{1}{5}x^5\right]_0^1 = 2\left(1 - \tfrac{1}{5}\right) = \tfrac{8}{5}$