

1989 AB2
Solution

$$\begin{aligned} \text{(a) Area} &= \int_0^2 \sqrt{6x+4} - 2x \, dx \\ &= \frac{1}{6} \cdot \frac{2}{3} (6x+4)^{3/2} - x^2 \Big|_0^2 \\ &= \left(\frac{64}{9} - 4 \right) - \frac{8}{9} = \frac{20}{9} \end{aligned}$$

(b) Volume about x -axis

$$V = \pi \int_0^2 (6x+4) - 4x^2 \, dx$$

or

$$V = \pi \int_0^2 (6x+4) \, dx - \frac{32\pi}{3}$$

(c) Volume about y -axis

$$V = 2\pi \int_0^2 x(\sqrt{6x+4} - 2x) \, dx$$

or

$$V = \pi \int_0^4 \left(\frac{y}{2} \right)^2 dy - \pi \int_2^4 \left(\frac{y^2 - 4}{6} \right)^2 dy$$