

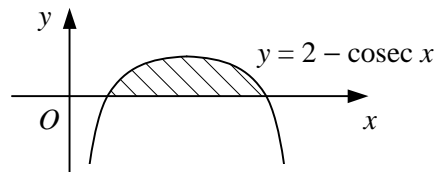
1 Use the trapezium rule with n intervals of equal width to estimate the value of each integral.

a $\int_1^5 x \ln(x+1) \, dx$ $n = 2$ **b** $\int_{\frac{\pi}{6}}^{\frac{\pi}{2}} \cot x \, dx$ $n = 2$

c $\int_{-2}^2 e^{\frac{x^2}{10}} \, dx$ $n = 4$ **d** $\int_0^1 \arccos(x^2 - 1) \, dx$ $n = 4$

e $\int_0^{0.5} \sec^2(2x-1) \, dx$ $n = 5$ **f** $\int_0^6 x^3 e^{-x} \, dx$ $n = 6$

2



The diagram shows the curve with equation $y = 2 - \operatorname{cosec} x$, $0 < x < \pi$.

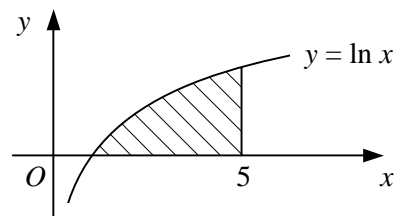
- a** Find the exact x -coordinates of the points where the curve crosses the x -axis.
b Use the trapezium rule with four intervals of equal width to estimate the area of the shaded region bounded by the curve and the x -axis.

3

$$f(x) \equiv \frac{\pi}{6} + \arcsin\left(\frac{1}{2}x\right), \quad x \in \mathbb{R}, \quad -2 \leq x \leq 2.$$

- a** Use the trapezium rule with three strips to estimate the value of the integral $I = \int_{-1}^2 f(x) \, dx$.
b Use the trapezium rule with six strips to find an improved estimate for I .

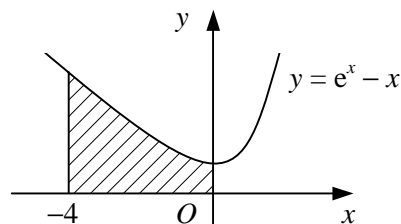
4



The shaded region in the diagram is bounded by the curve $y = \ln x$, the x -axis and the line $x = 5$.

- a** Estimate the area of the shaded region to 3 decimal places using the trapezium rule with
i 2 strips **ii** 4 strips **iii** 8 strips
b By considering your answers to part **a**, suggest a more accurate value for the area of the shaded region correct to 3 decimal places.
c Use integration to find the true value of the area correct to 3 decimal places.

5



The shaded region in the diagram is bounded by the curve $y = e^x - x$, the coordinate axes and the line $x = -4$. Use the trapezium rule with five equally-spaced ordinates to estimate the volume of the solid formed when the shaded region is rotated completely about the x -axis.