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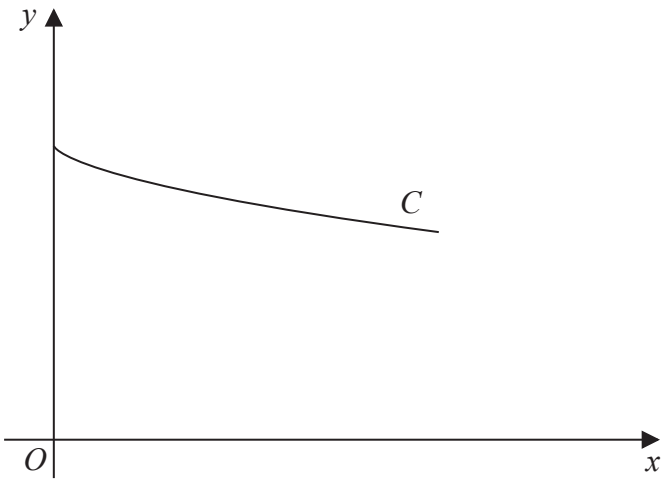


Figure 1

Figure 1 shows a sketch of the curve C with parametric equations

$$x = \ln(\sec\theta + \tan\theta) - \sin\theta \qquad y = \cos\theta \qquad 0 \leqslant \theta \leqslant \frac{\pi}{4}$$

The curve C is rotated through 2π radians about the x-axis and is used to form a solid of revolution S.

Using calculus, show that the **total** surface area of S is given by

$$\frac{\pi}{2}\left(p + q\sqrt{2}\right)$$

where p and q are integers to be determined.

(8)

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Q2

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