3.

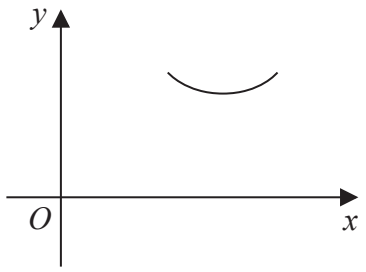


Figure 1

Figure 1 shows a sketch of the curve C with equation

$$y = \frac{1}{2}\left(\tan x + \cot x\right) \qquad \frac{\pi}{6} \leqslant x \leqslant \frac{\pi}{3}$$

(a) Show that the length of C is given by

$$\frac{1}{2}\int_{\frac{\pi}{6}}^{\frac{\pi}{3}}\left(\tan^2 x + \cot^2 x\right)\mathrm{d}x$$

(6)

(b) Hence determine the exact length of C, giving your answer in simplest form.

(5)

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

Question 3 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

Question 3 continued

(Total for Question 3 is 11 marks)