5.

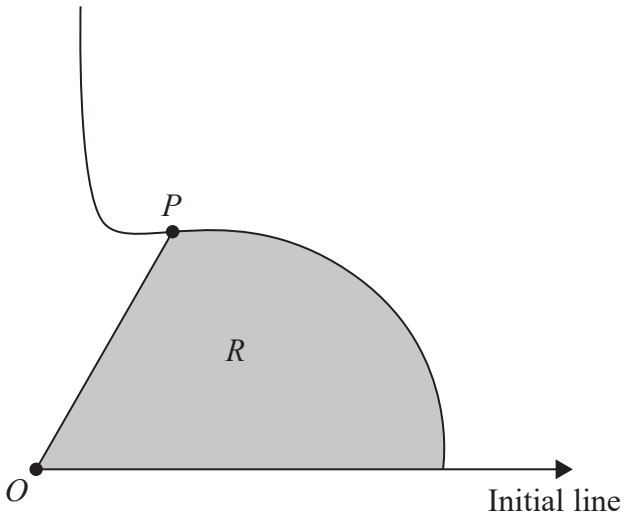


Figure 1

Figure 1 shows a sketch of the curve with polar equation

$$r = 10\cos\theta + \tan\theta \qquad 0 \leqslant \theta < \frac{\pi}{2}$$

The point P lies on the curve where $\theta = \frac{\pi}{3}$

The region R, shown shaded in Figure 1, is bounded by the initial line, the curve and the line OP, where O is the pole.

Use algebraic integration to show that the exact area of R is

$$\frac{1}{12}\left(a\pi + b\sqrt{3} + c\right)$$

where a, b and c are integers to be determined.

(9)

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