7: **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

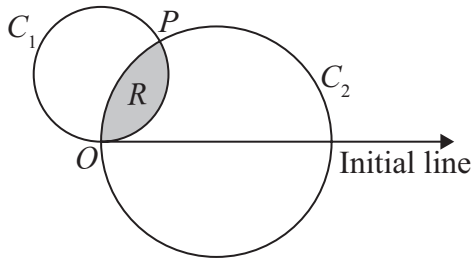


Figure 1

Figure 1 shows a sketch of the circles C_1 and C_2

The circle C_1 has polar equation

$$r = \sqrt{3}\sin\theta \qquad 0 \leqslant \theta \leqslant \pi$$

The circle C_2 has polar equation

$$r = 3\cos\theta \qquad -\frac{\pi}{2} \leqslant \theta \leqslant \frac{\pi}{2}$$

Circles C_1 and C_2 intersect at the origin O and at the point P.

(a) Determine the polar coordinates of P.

(2)

The finite region R is bounded by C_1 and C_2 and is shown shaded in Figure 1.

(b) Use algebraic integration to determine the exact area of R, giving your answer in the form $a\pi + b\sqrt{3}$ where a and b are simplified rational numbers.

(6)

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Question 7 continued

(Total for Question 7 is 8 marks)