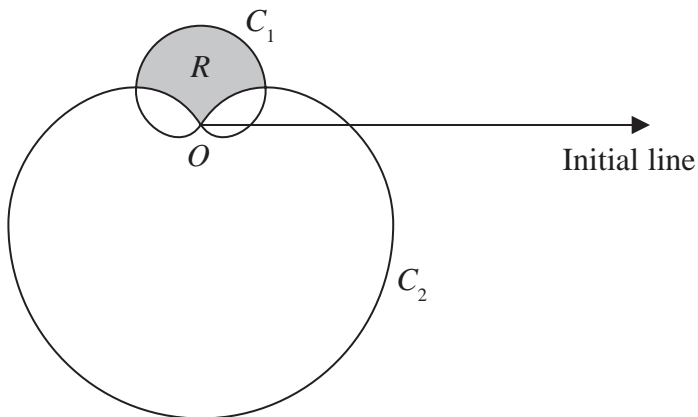**3.**

Figure 1

Figure 1 shows a sketch of two curves C_1 and C_2 with polar equations

$$C_1 \colon r = (1 + \sin\theta) \qquad 0 \leqslant \theta < 2\pi$$

$$C_2 \colon r = 3(1 - \sin\theta) \qquad 0 \leqslant \theta < 2\pi$$

The region R lies inside C_1 and outside C_2 and is shown shaded in Figure 1.

Show that the area of R is

$$p\sqrt{3} - q$$

where p and q are integers to be determined.

(9)