5. The locus C is given by

$$|z - 4| = 4$$

The locus D is given by

$$\arg z = \frac{\pi}{3}$$

(a) Sketch, on the same Argand diagram, the locus C and the locus D

(4)

The set of points A is defined by

$$A = \left\{ z \in \mathbb{C} : |z - 4| \leqslant 4 \right\} \cap \left\{ z \in \mathbb{C} : 0 \leqslant \arg z \leqslant \frac{\pi}{3} \right\}$$

(b) Show, by shading on your Argand diagram, the set of points A

(1)

(c) Find the area of the region defined by A, giving your answer in the form $p + q\sqrt{3}$ where p and q are constants to be determined.

(4)