3. (a) Determine, in simplest form, a Cartesian equation for

(i) the locus of points represented by $|z-3|=3\sqrt{2}$

(ii) the locus of points represented by $|z-2-\mathrm{i}|=|z+4+\mathrm{i}|$

(5)

(b) Find the complex numbers z that satisfy both

$$|z-3|=3\sqrt{2} \text{ and } |z-2-\mathrm{i}|=|z+4+\mathrm{i}|$$

(3)

The region R is defined by the inequalities

$$|z-3|\leqslant 3\sqrt{2} \text{ and } |z-2-\mathrm{i}|\geqslant |z+4+\mathrm{i}|$$

(c) On an Argand diagram, shade and label the region R.

(2)