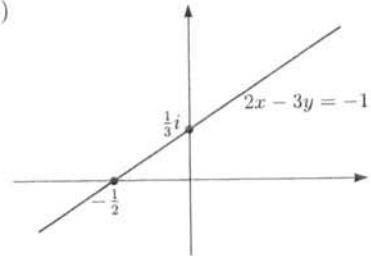


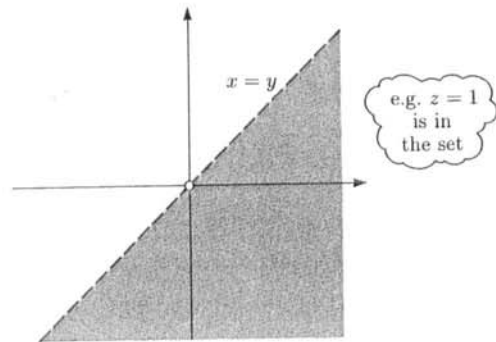
Section 4

4.2 (a) (i)



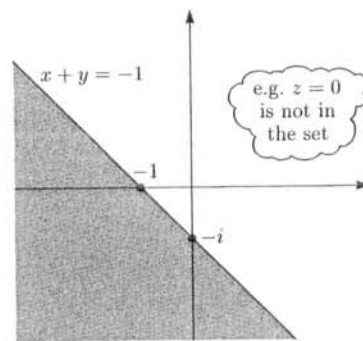
$$\{z : 2 \operatorname{Re} z - 3 \operatorname{Im} z = -1\}$$

(ii)



$$\{z : \operatorname{Re} z - \operatorname{Im} z > 0\}$$

(iii)



$$\{z : \operatorname{Re} z + \operatorname{Im} z \leq -1\}$$

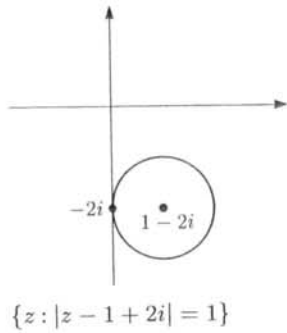
(b) The half-plane contains its boundary, which has equation

$$\frac{1}{2}x - y = -1.$$

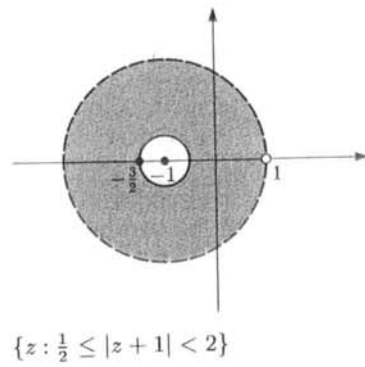
At $z = 0$, $\frac{1}{2}x - y > -1$, and since 0 is not in this half-plane, the half-plane is

$$\left\{z : \frac{1}{2} \operatorname{Re} z - \operatorname{Im} z \leq -1\right\}.$$

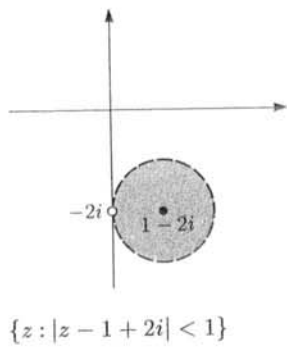
4.3 (a) (i)



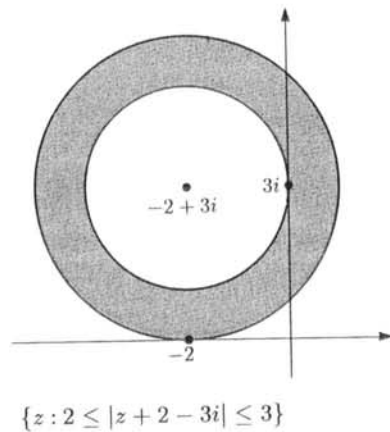
(ii)



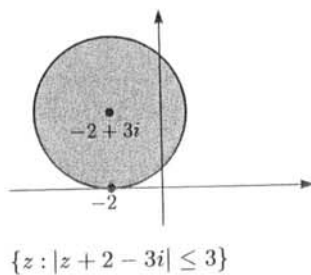
(ii)



(iii)



(iii)



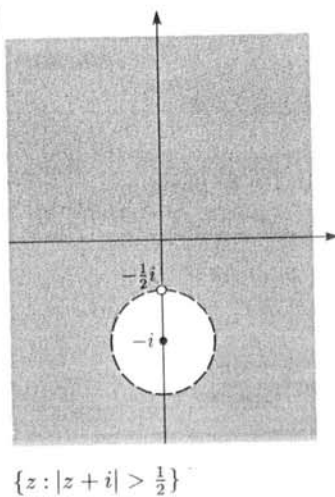
(b) This set is a punctured open disc with centre $1 - 2i$ and radius 1, so it is

$$\{z : 0 < |z - 1 + 2i| < 1\}.$$

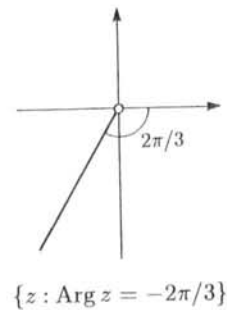
(b) This set is an open disc with centre $-1 - i$ and radius $|-1 - i| = \sqrt{2}$, so it is

$$\{z : |z + 1 + i| < \sqrt{2}\}.$$

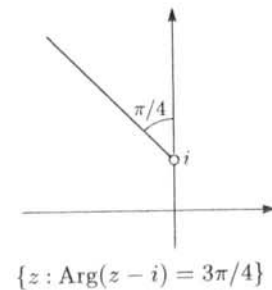
4.4 (a) (i)



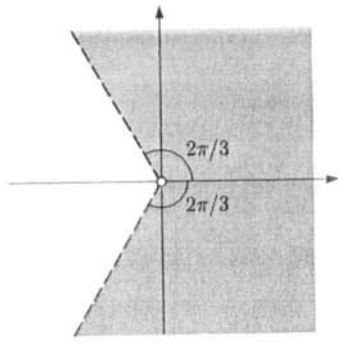
4.5 (a) (i)



(ii)



(iii)



$$\{z : |\operatorname{Arg} z| < 2\pi/3\}$$

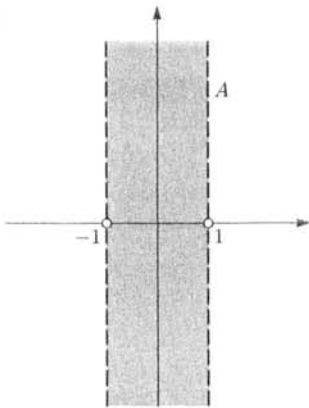
(b) This set is a sector (not an open one) having the rays

$$\{z : \operatorname{Arg}(z + 2i) = 0\} \quad \text{and} \quad \{z : \operatorname{Arg}(z + 2i) = \pi/4\}$$

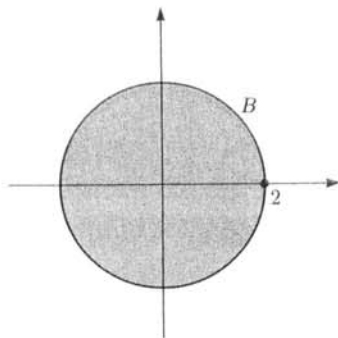
as boundary, so it is

$$\{z : 0 \leq \operatorname{Arg}(z + 2i) \leq \pi/4\}.$$

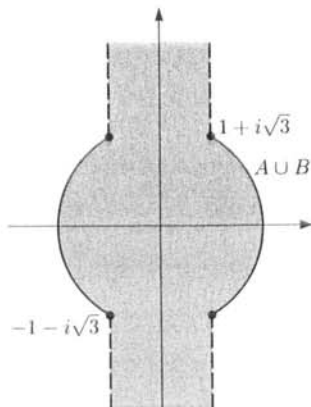
4.6 (a) (i)



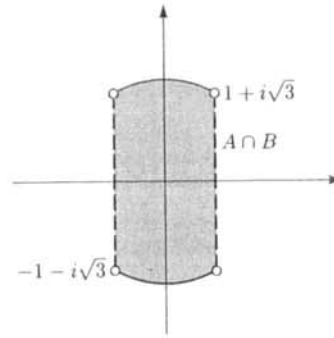
(ii)



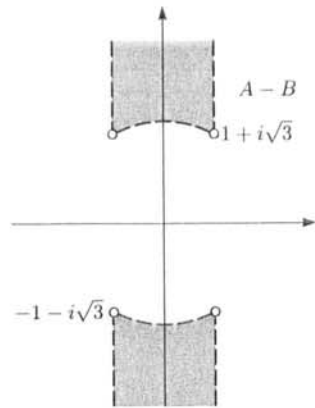
(iii)



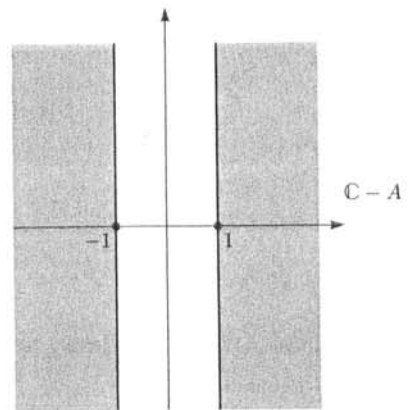
(iv)



(v)



(vi)



(b) $\mathbb{C} - (A \cup B)$ is the set of points z which lie in neither A nor B ; that is,

$$\{z : |\operatorname{Re} z| \geq 1, |z| > 2\}.$$