

**Question 3****(9 marks)**

(a) Let  $z = a + bi$  be any complex number.

(3 marks)

Obtain an equation relating  $a, b$  given that  $\operatorname{Re}\left(\frac{z-i}{z}\right) = 0$ .

(b) Let  $z = r \operatorname{cis} \theta$  be any complex number. Obtain an expression for:

(i)  $\frac{2i}{\bar{z}}$  in terms of  $r$ ;  $\theta$ .

(3 marks)

(ii)  $\arg(z + r)$  in terms of  $\theta$ .

(3 marks)