

QUESTION Express each of the following complex numbers in Cartesian form:

(a)  $e^{1+i\frac{\pi}{6}}$ .

(b)  $\text{Log}(1+i)$ .

(c)  $i^{\frac{i}{\pi}}$

ANSWER

(a)  $e^{1+i\frac{\pi}{6}} = e(\cos \frac{\pi}{6} + i \sin \frac{\pi}{6}) = \frac{e\sqrt{3}}{2} + \frac{ei}{2}$ .

(b)  $\text{Log}(1+i) = \log |1+i| + i\text{Arg}(1+i) = \log \sqrt{2} + i\frac{\pi}{4}$ .

(c)  $i^{\frac{i}{\pi}} = e^{\frac{i}{\pi} \log i} = e^{\frac{i}{\pi}(i\frac{\pi}{2}+2n)}$ , ( $n \in \mathbf{Z}$ ), ( $e^{-\frac{1}{2}}$  is the principle value).