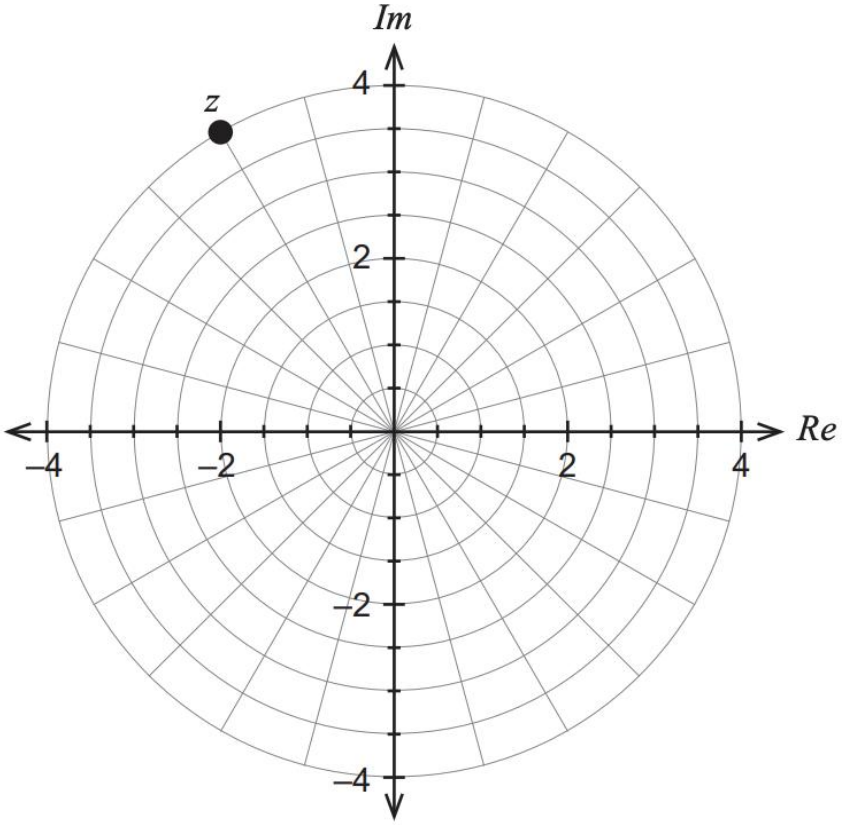
Question 12 **(10 marks)**

Let $w = \dfrac{1-i}{2\sqrt{2}}$.

(a) Express w in the form $w = r\,cis\theta$, where $-\pi < \theta \leq \pi$. (2 marks)

The complex number z is represented in the Argand diagram below.



(b) Express z exactly in the form $z = a + bi$. (2 marks)

(c) Determine the exact polar form for wz and w^2z. (2 marks)

(d) On the Argand diagram on page 6, plot the position for wz and w^2z. Ensure that each position is labelled clearly. (2 marks)

Consider the geometric transformation(s) applied to transform $z \rightarrow wz \rightarrow w^2z \rightarrow w^3z$ etc.

(e) Describe the geometric transformation(s) performed by the successive multiplication by w. (2 marks)