| Section A | Concepts and Skills | 150 marks |
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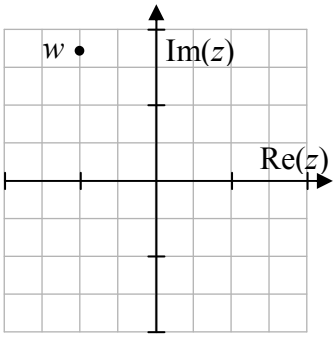
Answer **all six** questions from this section.

**Question 1** **(25 marks)**

**(a)** $w = -1 + \sqrt{3}i$ is a complex number, where $i^2 = -1$.




**(i)** Write $w$ in polar form.

**(ii)** Use De Moivre's theorem to solve the equation $z^2 = -1 + \sqrt{3}i$. Give your answer(s) in rectangular form.

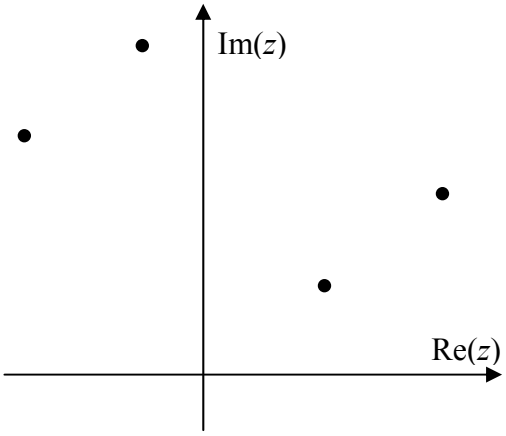
**(b)** Four complex numbers $z_1$, $z_2$, $z_3$ and $z_4$ are shown on the Argand diagram. They satisfy the following conditions:

$z_2 = iz_1$

$z_3 = kz_1$, where $k \in \mathbb{R}$

$z_4 = z_2 + z_3$.

The same scale is used on both axes.




**(i)** Identify which number is which, by labelling the points on the diagram.

**(ii)** Write down the approximate value of $k$.

Answer: _____

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