

MA30056: Complex Analysis

SELF-ASSESSMENT SHEET 1: COMPLEX NUMBERS

In the first three questions, click on “Evaluate” after you have ticked/filled in the appropriate statements/numbers.

1.) Tick the statements that are true.

- If $z_1 z_2$ is a real number, then z_1 and z_2 must be real. *Hint*
- $\text{Im}(2 + 3i) = 3i$. *Hint*

Evaluate

2.) Express each of the following in the form $a + ib$ where a and b are real (fill in the numbers)

- (i) $\frac{26}{6+4i} = \underline{\hspace{2cm}} + i \cdot \underline{\hspace{2cm}}$.
- (ii) $\frac{1-i}{1+i} = \underline{\hspace{2cm}} + i \cdot \underline{\hspace{2cm}}$.

Evaluate

3.) For each of the following sets, tick the property it has.

	open	closed	bounded	compact
$\{z \in \mathbb{C} \mid \text{Im } z > (\text{Re } z)^2\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\{z \in \mathbb{C} \mid 1 \leq z - 2 < 3\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\{z \in \mathbb{C} \mid (z + 2)^2 \geq 4\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\{z \in \mathbb{C} \mid 1 \leq 2 \text{Re } z + 3 \text{Im } z \leq 2\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\{z \in \mathbb{C} \mid z - 1 + z + 1 \leq 3\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
$\{z \in \mathbb{C} \mid z^9 + 3z^2 + 1 = 0\}$	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluate

4.) List three ways to define compactness of a set in \mathbb{C} .

For the solution, click on the following lines:

- (a) _____
- (b) _____
- (c) _____

Please turn over!

- 5.) Consider the Riemann sphere and the map $f(z) = 1/z$. Describe the action of f .
For the solution, click on the following space:
