Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-09-30, 23:59 IST.

1) For which of the following functions \( f: \mathbb{C} \setminus \{0\} \to \mathbb{C} \), does the limit \( \lim_{z \to 0} f(z) \) exist in the Complex plane \( \mathbb{C} \)?

- \( f(z) = \text{Re}(z) \)
- \( f(z) = \frac{1}{z} \)
- \( f(z) = \frac{e^z - 1}{z} \)
- \( f(z) = e^z \)
- \( f(z) = z \sin \left( \frac{1}{z} \right) \)

No, the answer is incorrect.
Score 0
Accepted Answers:
- \( f(z) = \text{Re}(z) \)
- \( f(z) = \frac{e^z - 1}{z} \)

2) Let \( z = e^{\pi i} \) for an integer \( n \geq 2 \). Check the boxes corresponding to which true statements are given.

- Then \( z \) is a root of unity.
- \( z \neq 1 \)
- Then \( z^n = 1 \) for a unique integer \( k \in \mathbb{Z} \).
- Then \( 1 + z + \ldots + z^{n-1} = 0 \).

No, the answer is incorrect.
Score 0
Accepted Answers:
- Then \( z \) is a root of unity.
- Then \( z \neq 1 \).
- Then \( 1 + z + \ldots + z^{n-1} = 0 \).

3) Recall that for a non-zero complex number \( z \in \mathbb{C} \), the argument of \( z \) given by \( \text{Arg}(z) \) is the real number \( \theta \in (-\pi, \pi] \) such that \( z = r e^{i\theta} \) for some \( r > 0 \). Check the boxes corresponding to which true statements are given.

- \( \text{Arg}(iz) = \text{Arg}(z) \)
- \( \text{Arg}(\frac{1}{z}) = -\text{Arg}(z) \)
- \( \text{Arg}(\frac{1}{z}) = \text{Arg}(z) \)
- \( \text{Arg}(\frac{1}{z}) = -\text{Arg}(z) \)
- \( \text{Arg}(z_1) = \text{Arg}(z_2) + \text{Arg}(z_3) \) for \( z_1, z_2, z_3 \in \mathbb{C} \setminus \{0\} \)

No, the answer is incorrect.
Score 0
Accepted Answers:
- \( \text{Arg}(i) = -\text{Arg}(z) \)
- \( \text{Arg}(\frac{1}{z}) = -\text{Arg}(z) \)

4) Which of the following functions is/are differentiable at \( z = 0 \)?

- \( f(z) = \text{Re}(z) \)
- \( f(z) = \text{Im}(z) \)
- \( f(z) = |z|^2 \)
- \( f(z) = \text{Im}(z) \)
- \( f(z) = \text{Re}(z) \)

No, the answer is incorrect.
Score 0
Accepted Answers:
- \( f(z) = |z|^2 \)

5) Let \( f \) be an entire function. Which of the following functions is/are also entire?

- \( g(z) = (f(z))^3 \)
- \( g(z) = f(z) \)
- \( g(z) = f(z - a), a \in \mathbb{C} \) is fixed.
- \( g(z) = f(z) \)

No, the answer is incorrect.
Score 0
Accepted Answers:
- \( g(z) = (f(z))^3 \)