Unit 3 - Week 1

Assignment 1 - Objective

The due date for submitting this assignment has passed. Due on 2020-02-12, 23:59 IST. As per our records you have not submitted this assignment.

1) State whether True or False.
For any two subsets \( A, B \),
\[ A \cup (B \times C) = (A \times B) \cup (A \times C). \]

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

2) State whether True or False.
Consider any two nonempty sets \( X, Y \) and subsets \( A, B \subseteq X \). For any function \( f : X \to Y \),
\[ f(A \cap B) = f(A) \cap f(B). \]

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
False

3) An algebraic number is defined to be a root of a polynomial, whose coefficients are all in \( \mathbb{Q} \).
The set of all algebraic numbers is countable.

- True
Let \((x_n), (y_n)\) be two sequences. Define two other sequences by 
\[ M_n = \max\{x_n, y_n\} \quad \text{and} \quad m_n = \min\{x_n, y_n\}, \text{ for all } n \geq 1. \]
Suppose \(\lim_{n \to \infty} x_n\) and \(\lim_{n \to \infty} y_n\) both exist. Then

\[ \lim_{n \to \infty} M_n \text{ exists but } \lim_{n \to \infty} m_n \text{ may not exist.} \]

\[ \lim_{n \to \infty} M_n \text{ may not exist but } \lim_{n \to \infty} m_n \text{ exists.} \]

Both \(\lim_{n \to \infty} M_n\) and \(\lim_{n \to \infty} m_n\) exist.

Both \(\lim_{n \to \infty} M_n\) and \(\lim_{n \to \infty} m_n\) need not exist.

No, the answer is incorrect.

Score: 0

Accepted Answers:
Both \(\lim_{n \to \infty} M_n\) and \(\lim_{n \to \infty} m_n\) exist.

5) Let \((x_n), (y_n)\) be two sequences such that
(i) \(x_n \leq y_n\), for all \(n \geq 1\).
(ii) \((x_n)\) is increasing and \((y_n)\) is decreasing.
(iii) \(\lim_{n \to \infty} x_n\) and \(\lim_{n \to \infty} y_n\) both exist. Then

\[ \lim_{n \to \infty} x_n \leq \lim_{n \to \infty} y_n \]

\[ \lim_{n \to \infty} x_n = \lim_{n \to \infty} y_n \]

It is possible that \(\lim_{n \to \infty} x_n > \lim_{n \to \infty} y_n\)

No, the answer is incorrect.

Score: 0

Accepted Answers:
\(\lim_{n \to \infty} x_n \leq \lim_{n \to \infty} y_n\)