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The Open University of Sri Lanka
B.Sc/ B.Ed Degree Programme
Open Book Test (OBT) -2023/2024
Pure Mathematics – Level 03
PEU3301 – Foundations of Mathematics

DURATION: ONE HOUR

Date: 25.08.2023 **Time: 9.00 a.m. – 10.00 a.m.**

ANSWER **ALL** QUESTIONS.

1. Let A, B and C be sets such that $A \subseteq B$. Prove that $C \backslash B \subseteq C \backslash A$.

2. Show that the relation R is an equivalence relation on the set $A = \{1, 2, 3, 4, 5\}$ given by the relation $R = \{(a, b): |a - b| \text{is even}\}$.

3. Let $f(x) = \pi x - \frac{\pi}{2}$, $x \in (0,\ 1)$. Show that f is a bijection from $(0,\ 1)$ into $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.

4. Let $f(x) = \frac{2x+1}{x-3}, x \in \mathbb{R}\backslash\{3\}$ and $g(x) = x^2 - 1,\ x \in \mathbb{R}$.
   i. Find $g \circ f$.
   ii. Using the given set $A = (3, 15]$, find $g^{-1}(A)$.

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