

The Open University of Sri Lanka
B.Sc./B.Ed. Degree Programme
No Book Test (NBT) - 2019/2020
Pure Mathematics - Level 04
PEU4316 -Differentiable Functions

Duration: One Hour.



Date: 11.08.2020

Time: 4.15 pm – 5.15 pm

Answer all Questions.

- 01)(a). Let $f(x) = 4x^2 - 4x + 1$. Prove that f has a local minimum at $\frac{1}{2}$.
- (b). Let $g(x) = -x^2 + 4x + 4$. Prove that g has a local maximum at 2.
- (c). Let f be a function defined on an open interval (a, b) . Prove that if there exists $c \in (a, b)$ such that f is differentiable at c and $f'(c) > 0$, then there exists $\delta > 0$ such that for each $x \in (c, c + \delta) \cap (a, b)$, $f(x) > f(c)$.
- 02)(a). State the Roll's Theorem.
- (b). Verify the Roll's Theorem for $h(x) = x^2 + 2x - 8$ in $[-4, 2]$.
- (c). Use the mean value theorem to prove that $|\sin x - \sin y| \leq |x - y|$ for each $x, y \in \mathbb{R}$