

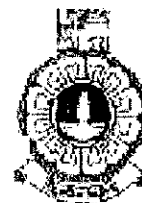
The Open University of Sri Lanka

B.Sc/B.Ed. Degree Programme – Level 04

Open Book Test (NBT) - 2017/2018

Pure Mathematics

PEU4316 – Differentiable Functions



Duration: - One Hour.

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Date: -29.01.2019

Time: - 4.15 p.m. – 5.15 p.m.

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Answer All Questions.

01. (a). Let  $f(x) = x^2 - 2x + 1$ . Prove that  $f$  has a local minimum at 1.  
(b). Let  $g(x) = -x^2 + 6x - 5$ . Prove that  $g$  has a local maximum at 3.  
(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  $h(x) = -x^2 + 4x - 3$  in  $[1, 3]$ .  
(c). Find a function  $f$  such that  $f$  is continuous on  $[0, 2]$ ,  $f(0) = f(2)$  and  $f'(c) \neq 0$  for each  $c \in (a, b)$ .

