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The Open University of Sri Lanka

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

Open Book Test (OBT) - 2017/2018

Pure Mathematics

PEU4316 – Differentiable Functions

Duration: - One Hour.

Date: -06.01.2019 **Time: - 2.30 p.m. – 3.30 p.m.**

Answer All Questions.

(01). (a). Let $f:\mathbb{R}\to\mathbb{R}$ be given by for each $x\in\mathbb{R}, f(x)=c$, where c is a constant.Using $\varepsilon-\delta$ definition. Prove that f is differentiable at 1 and $f'(1)=0$.

(b). Let $g(x)=x^3$, for $x\in\mathbb{R}$. Using $\varepsilon-\delta$ definition. Prove that g is differentiable at 1 and $g'(1)=3$.

(02). (a). Let $f(x)=\begin{cases}x^2, & x\le 0\\ 0, & x>0\end{cases}$ Prove that f is left differentiable at 0 and $f'_{-}(0)=0$.

(b). Find a function f such that f is differentiable at 3, but $|f|$ is not differentiable at 3.

(c). Find two functions f,g such that f,g are not differentiable at 4 and $f+g$ is differentiable at 4.