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The Open University of Sri Lanka
Department of Mathematics
B.Sc/B.Ed. Degree Programme
No Book Test (NBT) - 2017/2018
Pure Mathematics - Level 04
PEU4315 Continuous Functions

Duration: One Hour

Date: 26.07.2018 Time: 04.15pm - 05.15pm

Answer ALL Questions.

1. (a) Use Sandwich theorem to prove, $\lim_{x\to 0^+} \frac{x}{1+x^2} = 0$.

   (b) Let $f(x) = \frac{4x+3}{5x+6}$ for each $x > 0$. Using the definition, prove that $\lim_{x\to\infty} f(x) = \frac{4}{5}$.

   (c) Write two functions $f(x)$ and $g(x)$ be such that $\lim_{x\to 0} g(x)f(x)$ exists and $\lim_{x\to 0} g(x)f(x) = 0$, however $f(x)$ does not have a limit when x tends to 0 but $\lim_{x\to 0} g(x) = 0$.

2. (a) Let $f(x) = \frac{1}{(x-1)^2}$, $x \in \mathbb{R}\backslash\{1\}$. Show that $\lim_{x\to 1} f(x) = \infty$.

   (b) Let $f(x) = x^3 + 5x - 7$, $x \in \mathbb{R}$. Using the definition of continuity at a point, prove that f is continuous at 1.

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