InkMaths

QUESTION WORKBOOK

Limits and L'Hospital's rule

Further Pure 1 · Year FM

7 questions · 27 marks

PRINT EDITION

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SECTION A · Warm-up

A1 State L'Hospital's rule, including the condition under which it may be applied. [2]

A2 Evaluate the limit as $x \to 0$ of $(1 - \cos x)/x^2$. [3]

SECTION B · Standard

B1 Evaluate the limit as $x \to 0$ of $(e^x - 1 - x)/x^2$, by series and by L'Hospital's rule. [5]

B2 Given $\tan x = x + x^3/3 + 2x^5/15 + \ldots$, evaluate the limit as $x \to 0$ of $(\tan x - x)/x^3$. [3]

B3 Find the limit as $x \to \infty$ of $(1 + 3/x)^x$. [5]

B4 A student evaluates the limit as $x \to 0$ of $(x + \sin x)/(x + \tan x)$ by differentiating top and bottom with the quotient rule, and gets an answer of 0. Diagnose the error and give the correct limit. [3]

SECTION C · Stretch

C1 Show that $x \ln x \to 0$ as $x \to 0^+$, and hence find the limit of x^x as $x \to 0^+$. [6]