InkMaths

QUESTION WORKBOOK

Maclaurin series

Further algebra and series · Year FM

7 questions · 27 marks

PRINT EDITION

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SECTION A · Warm-up

A1 Write down the general Maclaurin series of a function f in terms of its derivatives at zero. [2]

A2 Derive the Maclaurin series of cos x up to the x^4 term, showing the derivative values you use. [3]

SECTION B · Standard

B1 Use the first three terms of the cosine series to estimate cos 0.2, and comment on the accuracy. [3]

B2 Write down the series for e^{3x} up to the x^3 term, and state the coefficient of x^3 exactly. [4]

B3 State the range of validity of the series for $\ln(1 + x)$, and deduce the range of validity for the series of $\ln(1 + 3x)$. [3]

SECTION C · Stretch

C1 Using $\ln((1 + x)/(1 - x)) = \ln(1 + x) - \ln(1 - x)$, show that the series begins $2(x + x^3/3 + \ldots)$, and use $x = 1/3$ to estimate $\ln 2$ from two terms. [6]

C2 Find the Maclaurin series of $\ln(1 + \sin x)$ up to and including the term in x^3. [6]