



QUESTION WORKBOOK

Maclaurin series

Further algebra and series · Year FM

7 questions · 27 marks

PRINT EDITION

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 $2(x + x^3/3 + \dots)$, 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]