Advanced Higher Maths

Further Sequences & Series

2001

Find the first four terms in the Maclaurin Series for $(2+x)\ln(2+x)$.

(4 marks)

2002

Find the Maclaurin expansion of $f(x)=\ln(\cos x)$, $0\le x\le\frac{\pi}{2}$, as far as the term in x^4

(5 marks)

2003

Obtain the Maclaurin Series for $f(x)=\sin^2 x$ up to the term in x^4.

Hence write down a series for $\cos^2 x$ up to the term in x^4.

(5 marks)

2004

Obtain the first three non-zero terms in the Maclaurin Series of $f(x)=e^x\sin x$.

(5 marks)

2005

Write down the Maclaurin expansion of e^x as far as the term in x^4.

Deduce the Maclaurin expansion of e^{x^2} as far as the term in x^4.

Hence or otherwise, find the Maclaurin expansion of e^{x+x^2} as far as the term in x^4.

(2, 1, 3 marks)

2007

Find the Maclaurin Series for $\cos x$ as far as the term in x^4.

Deduce the Maclaurin Series for $f(x)=\frac{1}{2}\cos 2x$ as far as the term in x^4.

Hence write down the first three non-zero terms of the series for $f(3x)$.

(2, 2, 1 marks)

2008

Obtain the first three non-zero terms in the Maclaurin expansion of $x\ln(2+x)$.

Hence, or otherwise, deduce the first three non-zero terms in the Maclaurin expansion of $x\ln(2-x)$.

Hence obtain the first two non-zero terms in the Maclaurin expansion of $x\ln(4-x^2)$.

(3, 2, 2 marks)

Advanced Higher Maths

2009

Express $\frac{x^2+6x-4}{(x+2)^2(x-4)}$ in partial fractions. Hence, or otherwise, obtain the first 3 non-zero terms in the Maclaurin expansion of $\frac{x^2+6x-4}{(x+2)^2(x-4)}$. **(4, 3, 2 marks)**

2010

Obtain the first three non-zero terms in the Maclaurin expansion of $(1+\sin^2 x)$.

(4 marks)

2011

Obtain the first four terms in the Maclaurin series of $\sqrt{1+x}$ and hence write down the first four terms in the Maclaurin series of $\sqrt{1+x^2}$.

Hence obtain the first four terms in the Maclaurin series of $\sqrt{(1+x)(1+x^2)}$.

(4, 2 marks)

2012

Write down the Maclaurin expansion of e^x as far as the term in x^3.
Hence, or otherwise, obtain the Maclaurin expansion of $(1+e^x)^2$ as far as the term in x^3.

(1, 4 marks)

2013

Write down the sums to infinity of the geometric series

$1+x+x^2+x^3+\ldots$

and

$1-x+x^2-x^3+\ldots$

valid for $|x|<1$.

Assuming that it is permitted to integrate an infinite series term by term, show that, for $|x|<1$,

$$\ln\left(\frac{1+x}{1-x}\right)=2\left(x+\frac{x^3}{3}+\frac{x^5}{5}+\ldots\right).$$

Show how this series can be used to evaluate $\ln 2$.
Hence determine the value of $\ln 2$ correct to 3 decimal places. **(7, 3 marks)**

Advanced Higher Maths

2014

Give the first three non-zero terms of the Maclaurin series for $\cos 3x$.
Write down the first four terms of the Maclaurin series for e^{2x}.
Hence, or otherwise, determine the Maclaurin series for $e^{2x}\cos 3x$ up to, and including, the term in x^3. **(2, 1 ,3 marks)**