

Section 1: Finding and using Maclaurin series

Exercise level 1

- For each of the following, find the first four terms of the Maclaurin series, giving the range of values of x for which the expansion is valid.
 - e^{-3x}
 - $\sin 2x$
 - $\ln(1-2x)$
 - $\cos \frac{1}{2}x$
- Sketch the curve $y = \arcsin x$.
 - Show that $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$.
 - Find the Maclaurin series for $\arcsin x$ up to the term in x^3 .
- Suppose the sin button on your calculator is broken. Use the Maclaurin series for $\sin x$ to give a value for $\sin(10^\circ)$ correct to six decimal places.
- Explain why the Maclaurin series for $\ln x$ does not exist.
Find the Maclaurin expansion for $\ln(x+2)$ as far as the term in x^3 .
- Find the coefficient of x^n in $(1+x)^{-2}$
 - by using the binomial expansion
 - by using the Maclaurin expansion.