

Maclaurin Series – Exercises (1 page; 6/2/26)

(1) Find a Maclaurin expansion (with 3 non-zero terms) for $\sin^2 x$ by two methods.

(2) Find the 1st 3 non-zero terms of the Maclaurin expansions of the following functions, and the intervals of validity of the infinite series:

(i) $\ln(3 - 2x)$

(ii) $\ln\left(\frac{\sqrt{1+3x}}{1-2x}\right)$

(iii) $e^{\cos x}$

(3) Use the 1st 5 terms of a Maclaurin expansion to find an approximate value for $P(Z < 1)$, where $Z \sim N(0,1)$ and Z has pdf

$$f(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

(4) Use 3 terms of a Maclaurin expansion of $\ln\left(\frac{1+x}{1-x}\right)$ to find an approximate value for $\ln\left(\frac{2}{3}\right)$

(5) Find the first 3 non-zero terms, as well as the general term in the Maclaurin expansion of $\cosh^3 x$.