[1]

5.6.1) Show that

[A] $\sin x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n+1}}{(2n+1)!}$

[B] $\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}$

- In section 6.1, e^{ix} is defined by a series expansion such that $e^{ix} = \cos x + i \sin x$
- This is the basis for the polar representation of complex quantities. As a special case we find, with $x = \pi$ $\rightarrow e^{ix} = -1$

★ Use the Taylor Series expansion around the origin, $f(x) = \sum_{n=0}^{\infty} \frac{x^n}{n!} f^n(0)$, and derive the power series expansions for $\sin x$, $\cos x$, and e^x. Then write out the first few real and imaginary terms in the expansion for e^{ix}, in order to demonstrate the well known complex exponential Euler formula, $e^{ix} = \cos x + i \sin x$, By collecting real and imaginary terms.