

1. By computing derivatives, find the Taylor series of

i)  $f(x) = e^{2x}$  at  $x_0 = 3$ .

ii)  $f(x) = \cos x$  at  $x_0 = \frac{\pi}{3}$ .

2. Find the Taylor series of  $\ln(1 + 2x^2)$  at  $x_0 = 0$ .

3. Using the Taylor Formula, show that  $\cos x = \sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!}$ .

4. Use series to estimate the integral's value

$$\int_0^{0.2} \sin x^2 dx.$$

with an error of magnitude less than  $10^{-8}$ .

5. Use series to evaluate the limits

i)  $\lim_{y \rightarrow 0} \frac{\arctan y - \sin y}{y^3 \cos y}$ .

ii)  $\lim_{x \rightarrow \infty} x^2(e^{-1/x^2} - 1)$ .