

1. By computing derivatives, find the Taylor series of

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

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

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