

MATE2101: Engineering Maths

CA

EXERCISE I: Prove the following

- 1) If for instance, $y = u \times v$. Let u become $u + \delta u$, v become $v + \delta v$, and y , $y + \delta y$. Prove that $\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$.
- 2) Let $y = x^n$. Suppose x to become $x + \delta x$, y becomes $y + \delta y$. Prove that $\frac{dy}{dx} = nx^{n-1}$.
- 3) Let $y = \tan x$. Suppose x to become $x + \delta x$, y becomes $y + \delta y$. Prove that $\frac{dy}{dx} = \frac{1}{\cos^2 x}$.
- 4) Let $y = \log_a x$. Suppose x to become $x + \delta x$, y becomes $y + \delta y$. Prove that $\frac{dy}{dx} = \frac{1}{x}$, for $a = e$.
- 5) If $y = A \sin px + B \cos px$, prove that $\frac{d^2y}{dx^2} + p^2y = 0$.

EXERCISE II: Find the n^{th} differential co-efficient of the following functions.

- 1) $y = \log_e(6x + 8)^5$, find $\frac{d^ny}{dx^n}$.
- 2) $y = u \times v$, u and v being both functions of x . find $\frac{d^ny}{dx^n}$

EXERCISE III:

Show that the limiting value of $\frac{x^n - 1}{x - 1}$ when $x = 1$ is n .