1. Find the derivative of the following function from 1st principle: $Sin(Log_e x)$
2. Find the general solution of the following differential equation: $\frac{dy}{dx} + P(x)y = Q(x)$
3. Solve the second order differential equation: $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 5y = 0$ with the initial condition $x = 0$.
4. If $y = \frac{\sqrt{x^2+1} - \sqrt{x^2-1}}{\sqrt{x^2+1} + \sqrt{x^2-1}}$ then show that $\frac{dy}{dx} = 2x - \frac{2x^3}{\sqrt{x^4-1}}$.