

Answer on Question #51606 – Math – Calculus

(a) Differentiate the following function

$$y = x^2 e^x$$

(b) A cosmetic company is planning the introduction of a promotion of a new lipstick line. The marketing research department after test marketing the new line in a carefully selected city found that the demand in the city is approximately given by $p = 12e^{-x}$, where x which should be within this range, $0 \leq x \leq 2$ were thousand lipsticks sold per week at a price of Kenya shillings. At what price will the weekly revenue be at maximum? What is the maximum weekly revenue

Solution

(a) $y = x^2 e^x$, $y' = 2xe^x + x^2 e^x = x(x + 2)e^x$.

(b) Revenue $R = p * x = 12xe^{-x}$

$$\frac{dR}{dx} = 12e^{-x} - 12xe^{-x} = 12(1 - x)e^{-x}.$$

$$\frac{dR}{dx} = 0 \rightarrow x = 1.$$

$$R(1) = 12e^{-1} \approx 4.416.$$

The weekly revenue be at maximum at price 1 Kenya shilling.

The maximum weekly revenue 4416 Kenya shillings.