

## Answer on Question #51480 – Math - Differential Calculus | Equations

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

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

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

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

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

The maximum weekly revenue 4416 Kenya shillings.