A company manufacturers and sells x electronics drills per month. The monthly coast and price-demand equations are $C(x) = 69000 + 40x,\ \ p = 190 - \frac{x}{30}, 0 \leq x \leq 5000$

(A) Find the production level that results in the maximum revenue

(B) Find the price that the company should charge for each drill in order to maximize profit.

(C) Suppose that a 5 dollar per drill tax is imposed. Determine the number of drills that should be produced and sold in order to maximize profit under this new circumstances

Solution:

(A) Revenue $p \cdot x = 190x - \frac{x^2}{30}$

$$(p \cdot x)' = 190 - \frac{x}{15} = 0 \rightarrow x = 2850$$

Production level is 2850.

(B) Profit =Revenue-Cost=$190x - \frac{x^2}{30} - 69000 - 40x = -\frac{x^2}{30} + 150x - 69000$

$$\frac{d(-\frac{x^2}{30} + 150x - 69000)}{dx} = -\frac{x}{15} + 150 = 0 \rightarrow x = 2250$$

$$p = 190 - \frac{2250}{30} = \$115$$

Price is $115.

(C) With $5 tax the price-demand equation should be

$$p = 190 - \frac{x}{30} + 5$$

Profit =$195x - \frac{x^2}{30} - 69000 - 40x = -\frac{x^2}{30} + 155x - 69000$

$$\frac{d(-\frac{x^2}{30} + 155x - 69000)}{dx} = -\frac{x}{15} + 155 = 0 \rightarrow x = 2325$$

Number of drills is 2325.