Assignment 2

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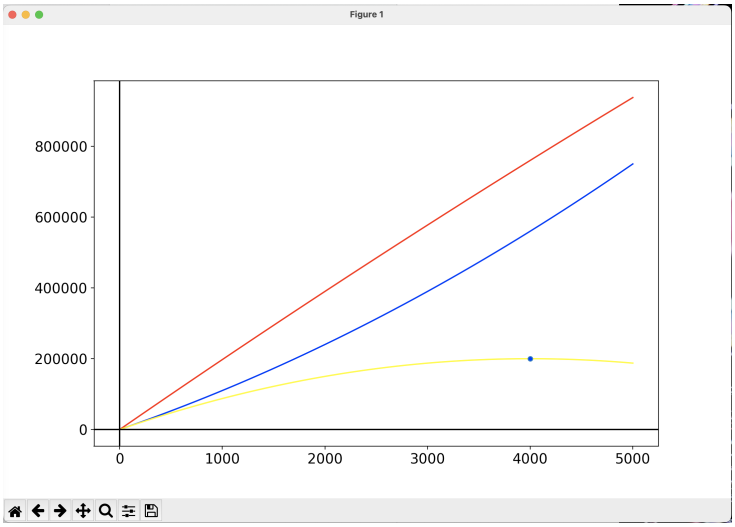
Question 21(a) A product can be manufactured at a total cost $C(x) = \frac{x^2}{100} + 100x + 40$, where x is the number of units produced. The price at which each unit can be sold is given by P = $200 - \frac{x}{400}$. Determine the production level x at which the profit is maximum. What is the price per unit and total profit at the level of production?



Solution.

$$c(x) = \frac{x^2}{100} + 100x + 40 \tag{1}$$

$$\frac{p(x)}{x} = 200 - \frac{x}{400} \tag{2}$$

$$Profit = p(x) - c(c) \tag{3}$$

For maximum profit $\frac{dProfit}{dx} = 0$

$$\implies 100 - \frac{x}{40} = 0 \tag{4}$$

$$\implies x = 4000 \tag{5}$$

The total production level $x = 4000$.

$$Price\ per\ unit = \frac{c(x)}{x} = 190 \tag{6}$$

$$p(x) = 199960 \tag{7}$$

Total profit = 199960