

Question 5

A company produces and sells x units of a product per week. The weekly revenue and cost functions (in thousands of dollars) are:

$$R(x) = 200x - 2x^2, \quad C(x) = 50x + 300$$

- (a) Find the profit function $P(x)$.
- (b) Determine the number of units that maximizes the profit.
- (c) Compute the maximum profit.

Question 5 - Solution

$$P(x) = R(x) - C(x) = -2x^2 + 150x - 300.$$

In the continuous model, $P'(x) = -4x + 150 = 0$ gives $x = 37.5$ and $P''(x) = -4 < 0$.

The continuous maximum is 2512.5 thousand dollars.

For whole units, compare $x = 37$ and $x = 38$, the integers nearest the vertex:

$$P(37) = P(38) = 2512.$$

Thus the feasible maximum is

37 or 38 units,	2512 thousand dollars.
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