

Answer on Question #58193 – Math – Calculus

Question

The original function used to model the cost of producing x PortaBoys Game Systems was $C(x) = 80x + 150$.

While developing their newest game, Sasquatch Attack!, the makers of the PortaBoy revised their cost function using a cubic polynomial. The new cost of producing x PortaBoys is given by

$$C(x) = .03x^3 - 4.5x^2 + 227x + 250.$$

Market research indicates that the demand function

$$p(x) = -1.5x + 250$$

remains unchanged. Find the production level x that maximizes the profit made by producing and selling x PortaBoys. (Round your answer to the nearest whole number.)

Solution

Total cost of producing: $TC(x) = 0.03x^3 - 4.5x^2 + 227x + 250$

Demand function: $p(x) = -1.5x + 250$

where $p(x)$ = price, x = production level.

Total revenue is given by the formula: $TR = p(x) * x = (-1.5x + 250) * x = -1.5x^2 + 250x$

Find the marginal rent: $MR = (TR)' = -3x + 250$

Define the function of marginal costs: $MC = (TC)' = 0.09x^2 - 9x + 227$

The condition of maximum profit is as follows: $MC = MR$

$$0.09x^2 - 9x + 227 = -3x + 250$$

$$0.09x^2 - 6x - 23 = 0$$

$$x = 70$$

Answer: 70.