Answer on Question #54827 – Math – Calculus

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) = .03x3 − 4.5x2 + 229x + 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.)
x =_____ PortaBoys

Solution.

Profit $\boldsymbol{P(x) = R(x) - C(x) = xp(x) - C(x) =}$

$$= x(-1.5x + 250) - (0.03x^3 - 4.5x^2 + 229x + 250) =$$

$$= -0.03x^3 + 3x^2 + 21x - 250.$$

$$P'(x) = -0.09x^2 + 6x + 21;$$

$$P'(x) = 0 \rightarrow \quad -0.09x^2 + 6x + 21 = 0 \rightarrow \quad x = 70.$$