Answer on Question #55107 – Math – Algebra

The international silver strings submarine band holds a bake sale each year to fund their trip to the national sasquatch convention. It has been determined that the cost in dollars of baking x cookies is

C(x) = 0.5x + 22 (cost function)

and the demand function for their cookies is p = 15 − 0.05x. how many cookies should they bake in order to maximize their profit?

Solution

The corresponding profit function is given by
$$P(x) = R(x) - C(x),$$
where
$$R(x) = px = (15 - 0.05x)x = 15\,x - 0.05x^2.$$
Then we need to find the maximum of function
$$P(x) = 15\,x - 0.05x^2 - 0.5x - 22 = 14.5\,x - 0.05x^2 - 22.$$
Set the derivative of $P(x)$ equal to zero:
$$P'(x) = 14.5 - 0.1x = 0,$$
$$x = 145.$$
The second derivative of $P(x)$ is equal to
$$P''(x) = -0.1.$$

If $x = 145$, then the profit
$$P(145) = 14.5 \cdot 145 - 0.05 \cdot 145^2 - 22 = 1029.25 \text{ (dollars)}$$
will be maximal.

Answer: the International Silver Strings Submarine Band must bake 145 cookies.