

Math 112 - Solutions to Quiz 4

A firm that produces Things has average cost, in dollars per Thing, given by

$$AC(x) = 2x^2 + 15x + \frac{600}{x}$$

where x is the quantity of Things produced. The demand for x units of its product is given by $p = 10500 - 30x$, dollars per Thing.

1.

$$P(x) = \left[\left(2x^2 + 15x + \frac{600}{x} \right) x \right] - [(10500 - 30x)x] = -2x^3 - 45x^2 + 10500x - 600$$

2.

$$P'(x) = -6x^2 - 90x + 10500 = -6(x^2 + 15x - 1750) = 0$$

$$x = \frac{-15 \pm \sqrt{225 + 7000}}{2} = 35 \text{ or } -50$$

So at $x = 35$ Things.

3. Using the second derivative:

$$P''(x) = -12x - 90$$

$$P''(35) = -12(35) - 90 < 0$$

so the graph of P is concave down at $x = 35$ making it a (local) max.

4.

$$P(35) = -2(35)^3 - 45(35)^2 + 10500(35) - 600 = 226,025$$

5. $p(35) = 10500 - 30 \cdot 35 = 9450$ dollars.