Answer on question 36729 – Math – Calculus

The manager of a large apartment complex knows from experience that 100 units will be occupied if the rent is 400 dollars per month. A market survey suggests that, on average, one additional unit will remain vacant for each 8 dollar increase in rent. Similarly, one additional unit will be occupied for each 8 dollar decrease in rent. What rent should the manager charge to minimize revenue?

Solution

Let R(x) is a manager's revenue and x is a number of $8 in rent.

Consider two cases.

1) If the rent is increase than

$$R(x) = (100 - x)(400 + 8x) = -8x^2 + 400x + 40000$$
$$R'(x) = -16x + 400 = 0, \qquad x_{max} = 25, \qquad R_{max} = R(25) = 45000.$$

2) If the rent is decrease than

$$R(x) = (100 + x)(400 - 8x) = -8x^2 - 400x + 40000$$
$$R'(x) = -16x - 400 = 0, \qquad x_{max} = -25, \qquad R_{max} = R(-25) = 45000.$$

The manager should either increase the rent by 25*8=200 dollars, or decrease the rent by 200 dollars. Either a rent of 600 or 200 will maximize revenue.

Answer: Either a rent of 600 or 200 will maximize revenue.