

Class Drill: When the Variable is Not the Demand (Section 4.6)

A hotel can rent 300 rooms a night when the rent is \$80 a room.

For each \$1 increase in rent, 3 fewer rooms are rented.

It costs the hotel \$10 to clean each rented room each day.

(A) How much should the management charge for each room to maximize revenue?

(B) How much should the management charge for each room to maximize profit?

Observe that $Revenue = rent \cdot occupancy$.

And observe that $Profit = Revenue - cleaning\ costs$

Let n be a variable representing the number of \$1 increases in rent. (Increases above \$80)

(i) Find a formula for $rent$ in terms of n .

(ii) Find a formula for $occupancy$ in terms of n .

(iii) Use your formulas for $rent$ and $occupancy$ to build a formula for $Revenue$ in terms of n .
Then use calculus to maximize the $Revenue$ and answer Question (A)

(iv) Find a formula for *cleaning costs* in terms of n .

(v) Use your formulas for *Revenue* and *cleaning costs* to build a formula for *Profit* in terms of n . Then use calculus to maximize the *Profit* and answer Question (B).