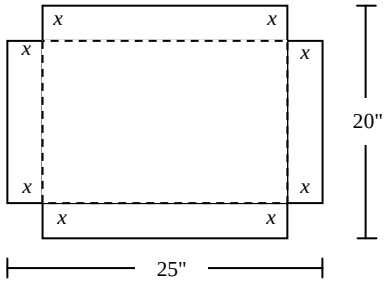
2.5 MAXIMUM – MINIMUM PROBLEMS: BUSINESS AND ECONOMICS APPLICATIONS

The only thing new in this section is that YOU have to write the equation.

- Write an equation for what you are trying to maximize or minimize
- Express your equation with ONE variable
- Determine the maximum or minimum using techniques from previous sections
    - Find critical points where first derivative equals zero or is undefined
    - Determine whether the critical points give you a maximum or minimum.
        - Use the first derivative test with a sign chart.
        - Plug the critical numbers into the original function. Remember to include the endpoints if the interval is closed.
        - Use the second derivative test if there is only one critical number and the second derivative is fairly easy to find.

Example: Maximize $Q = 2x^2 + 3y^2$, where $x + y = 5$.

Example: An open-top box is to be made by cutting congruent squares of side length x from the corners of a 20- by 25-inch sheet of tin and bending up the sides (see figure below). How large should the squares be to make the box hold as much as possible? What is the resulting volume?



Cost, Revenue, Profit

Revenue = (number of items sold)(price per item)

Cost = (amount of money needed to produce a total of x items)

Profit = Revenue – Cost

Example: Raggs, Ltd, a clothing firm determines that in order to sell x suits, the price per suit must be $p = 150 - 0.5x$. It also determines that the total cost of producing x suits is given by $C(x) = 4000 + 0.25x^2$

a) Find the total Revenue, $R(x)$.

b) Find the total Profit, $P(x)$

c) How many suits must the company produce and sell in order to maximize profit?

d) What is the maximum profit?

e) What price per suit must be charged in order to maximize profit?