DAY 7 Lesson Notes

PC 11: Completing the Square: Word Problems

Sales/ Ticket Problems Revenue = Price x Amount Sold

1) Last year the grad photo session fee was $10 and 400 grads booked photo sessions. This year the grad committee estimates that for every $1 increase in the price, they expect to have 20 fewer grad photo sessions booked. What price will generate the max revenue.

New price: $10 + x $15 let x = #number of 1 dollar increases

New amount: 400 − 20x 300

max Revenue = Price x Amount

$R = (10+x)(400-20x)$

$R = 4000 - 200x + 400x - 20x^2$

$R = -20x^2 + 200x + 4000$ Quadratic

calc

$V(5, 4500)$

Complete the □

$R = (-20x^2 + 200x) + 4000$

$R = -20(x^2 - 10x) + 4000$

$R = -20(x^2 - 10x + 25 - 25) + 4000$

$-20[(x-5)^2 - 25] + 4000$

$R = -20(x-5)^2 + 500 + 4000$

$R = -20(x-5)^2 + 4500$ $V(\underset{x}{5}, 4500)$

2) A company can sell 60 canoes at $500 each. For every $50 increase in the price, the number of canoes sold will drop by 4. Calculate the maximum revenue and price.

R = Price x Amount

New price: $(500 + 50x)$ let x = # of 50$ increases

Amount: $(60 - 4x)$

$R = (500+50x)(60 - 4x)$

$R = 30\,000 - 2000x + 3000x - 200x^2$

$R = -200x^2 + 1000x + 30,000$

Complete Square:

$R = -200(x^2 - 5x) + 30,000$

$R = -200\left(x^2 - 5x + \frac{25}{4} - \frac{25}{4}\right) + 30,000$

$R = -200\left[\left(x - \frac{5}{2}\right)^2 - 25/4\right] + 30,000$

$R = -200\left(x - \frac{5}{2}\right)^2 + 1250 + 30,000$

$R = -200\left(x - 5/2\right)^2 + 31,250$

$V(2.5, 31250)$

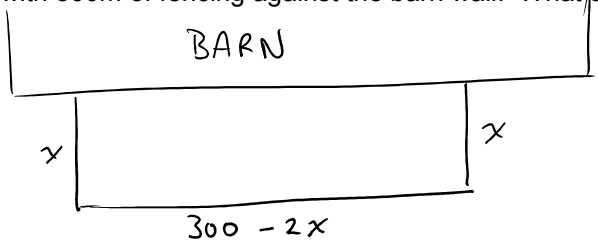
Max revenue is $31,250.00

price is $625.00

Area Questions:

Usually involve a three sided figure against a wall etc.

3) A rectangular pen is constructed with 300m of fencing against the barn wall. What dimensions give the maximum area?



Area = $l \cdot w$

Area = $(x)(300 - 2x)$

Area = $300x - 2x^2$

Area = $-2x^2 + 300x$

↓ $V(75, 11250)$

4. Find the value of x that gives the maximum area:

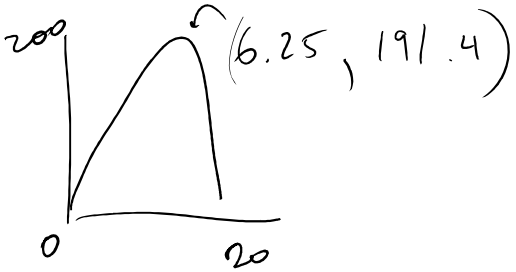
use decimals

5x + 10

42 - 2X

5. Projectiles: They usually give you the formula for the situation. Use graphing calculator if the numbers are "ugly"

A ball is thrown through the air and the function $H(t) = -4.9\,t^2 + 61.25\,t$ describes its height through the flight, where t = time in seconds. What is the maximum height and when does this occur?



191.4m

at 6.25 seconds into flight