Are there any questions from last day's assigned work you would like to see on the board?

pp. 214-215 # 6f, 7f, 10, 11 **AND**
READ p. 225 **AND**
p.226 # 1-11

6, 7, 10

Today's Learning Goal(s):

By the end of the class, I will be able to:

a) Solve problems involving quadratic functions and equations arising from standard and vertex form.

p. 214 **11.** A theatre company's profit, $P(x)$, on a production is modelled by
A $P(x) = -60x^2 + 1800x + 16\,500$, where x is the cost of a ticket in dollars. According to the model, what should the company charge per ticket to make the maximum profit?

<> : find the vertex

$x = \frac{-b}{2a}$

$= \frac{-(1800)}{2(-60)}$

$= \frac{-1800}{-120}$

$= 15$

∴ the company should charge $15 / ticket.

p. 226 **6.** The cost, $C(n)$, of operating a cement-mixing truck is modelled by the function $C(n) = 2.2n^2 - 66n + 700$, where n is the number of minutes the truck is running. What is the minimum cost of operating the truck?

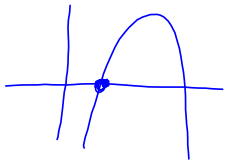
→ find the vertex

$n = \frac{-b}{2a}$

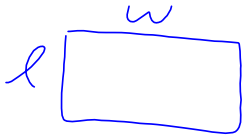
$= \frac{-(-66)}{2(2.2)}$

$= 15$

→ $C(15) = 2.2(15)^2 - 66(15) + 700$



7. A police officer has 400 m of yellow tape to seal off the area of a crime scene. What is the maximum area that can be enclosed?



$\therefore 400 = 2l + 2w$

$400 - 2l = 2w$

$200 - l = w$

$A = lw$

$= l(200 - l)$

$= 200l - l^2$

$= -l^2 + 200l$

10. A theatre company's profit can be modelled by the function $P(x) = -60x^2 + 700x - 1000$, where x is the price of a ticket in dollars. What is the break-even price of the tickets?

Let $P(x) = 0$

$= -60x^2 + 700x - 1000$

$= -10(6x^2 - 70x + 100)$

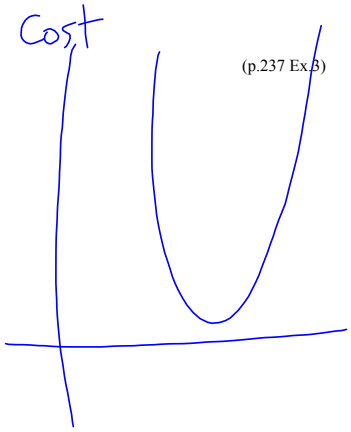
MCF 3MI

4.5 Using Quadratic Function Models to Solve Problems

Date: Oct. 30/19

Ex. 1: The cost of running an assembly line is a function of the number of items produced per hour. The cost function is, $C(x) = 0.28x^2 - 1.12x + 2$

where $C(x)$ is the cost per hour in thousands of dollars, and x is the number of items produced per hour, in thousands. Determine the most economical production level.



(p.237 Ex.3)

$x = \frac{-b}{2a}$

Slowest possible cost ∴ find the vertex.

$C(x) = 0.28x^2 - 1.12x + 2$

$= 0.28(x^2 - 4x) + 2$

$= 0.28(x^2 - 4x + 4 - 4) + 2$

$= 0.28(x-2)^2 + 0.28(-4) + 2$

$= 0.28(x-2)^2 - 1.12 + 2$

$= 0.28(x-2)^2 + 0.88$

$0.88 \times 1000 = \$880$

$2 \times 1000 = 2000$

the most economical production level is 2 000 items per hour.

Ex. 2: A bus company usually charges \$2 per ticket, but wants to raise the price by 10 cents per ticket. The revenue that could be generated is modelled by the function,

$$R(x) = -40(x-5)^2 + 25000$$

where x is the number of 10 cent increases and the revenue, $R(x)$, is in dollars.
What should the price of the tickets be if the company wants to earn \$21 000? (p.238 Ex.4)

$21000 = -40(x-5)^2 + 25000$

$0 = -40(x-5)(x-5) + 25000 - 21000$

$= -40(x^2 - 5x - 5x + 25) + 4000$

$= -40(x^2 - 10x + 25) + 4000$

$= -40x^2 + 400x - 1000 + 4000$

$= -40x^2 + 400x + 3000$

$= -40(x^2 - 10x - 75)$

$= -40(x-15)(x+5)$

$x = 15$ or $x = -5$ inadmissible

15, 10¢ increases ← price must be raised

∴ \$1.50 increase.

\$2 ticket + \$1.50

1 75
2
3 25
4
+5 -15

the new ticket price should be \$ 3.50 .

Today's Assigned Practice:

pp. 239-241 # 2, 4 – 8, 13 **AND**
READ p. 253 **AND**
Work ahead on Review: pp. 254-255 # 1 – 10