Are there any Homework Questions you would like to see on the board?

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

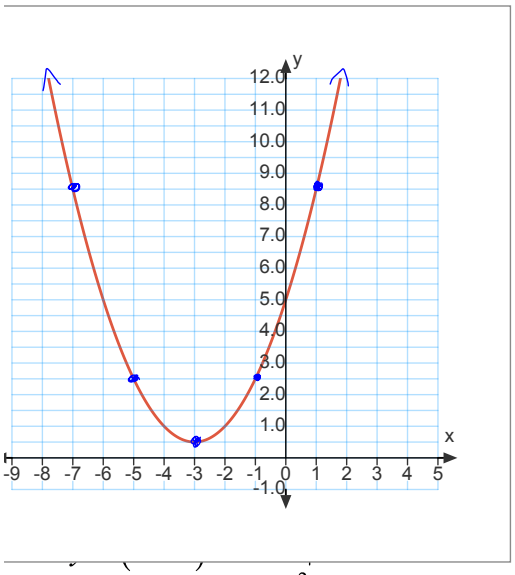
Today's Learning Goal(s):

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 **7.** Complete the square to express each function in vertex form. Then graph each, and state the domain and range.

a) $f(x) = x^2 - 4x + 5$
b) $f(x) = x^2 + 8x + 13$
c) $f(x) = 2x^2 + 12x + 19$
d) $f(x) = -x^2 + 2x - 7$
e) $f(x) = -3x^2 - 12x - 11$
f) $f(x) = \frac{1}{2}x^2 + 3x + 4$



$y = 0.5(x+3)^2 + 0.5$

$= \frac{1}{2}(x^2+6x)+4$
$= \frac{1}{2}(x^2+6x+9-9)+4$
$= \frac{1}{2}(x+3)^2+\frac{1}{2}(-9)+4$
$= \frac{1}{2}(x+3)^2-\frac{9}{2}+\frac{8}{2}$
$= \frac{1}{2}(x+3)^2+\frac{1}{2} \rightarrow \therefore V(-3, \frac{1}{2})$

MG $a=\frac{1}{2}$
1 ~~1~~ →
2 ~~4~~ → 2
3 ~~9~~
4 ~~16~~ → 8

D: $\{x \in \mathbb{R}\}$
R: $\{y \in \mathbb{R} \mid y \geq \frac{1}{2}\}$

p. 215 **11.** A theatre company's profit, $P(x)$, on a production is modelled by $P(x) = -60x^2 + 1800x + 16\,500$, 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?

$P(x) = -60(x^2 - 30x) + 16\,500$
$= -60(x^2 - 30x + 225 - 225) + 16\,500$
$= -60(x-15)^2 - 60(-225) + 16\,500$
$= -60(x-15)^2 + 13\,500 + 16\,500$
$= -60(x-15)^2 + 30\,000$

$\therefore$ the company should charge $15 per ticket.

MCF 3MI

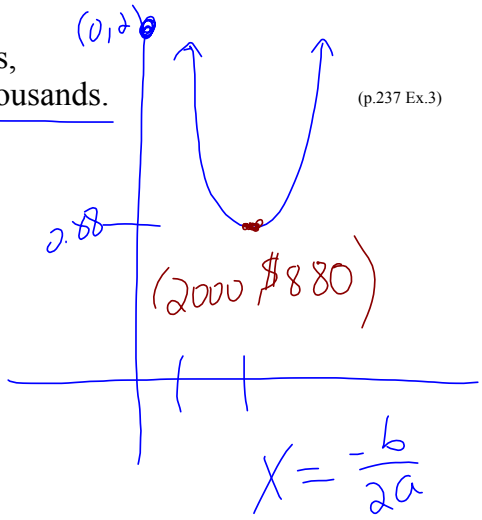
4.5 Using Quadratic Function Models to Solve Problems

Date: Apr. 5/19

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)



↳ Lowest possible cost

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

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

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

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

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

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

↳ 2000 items/hour

88 x 1000

$880

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)

$21\,000 = -40(x-5)^2 + 25\,000$ ↪ $R(x)$

$0 = -40(x-5)^2 + 25000 - 21000$

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

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

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

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

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

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

$x = -5$ ✓ or $x = 15$

1 | 75
3 | 25
5 | -15

inadmissible
price must be raised

↳ ∴ 15, 10¢ increases
↳ \$1.50 increase

the new ticket price should be \$ 3.50 .

\$2 + \$1.50
= \$3.50

Today's Homework:

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