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

Last day's work:

p.154 #11c

pp. 153-154 #3, 4ace, 5ac, 7ac, 8, 11

11. The profit $P(x)$ of a cosmetics company, in thousands of dollars, is given by
    A $P(x) = -5x^2 + 400x - 2550$, where x is the amount spent on advertising,
    in thousands of dollars.
    a) Determine the maximum profit the company can make.
    b) Determine the amount spent on advertising that will result in the
       maximum profit.
    c) What amount must be spent on advertising to obtain a profit of at least
       $4 000 000? $= P(x)$

$\hookrightarrow$ 4M must be in thousands $\therefore$ 4000

$$4000 = -5x^2 + 400x - 2550$$

$$5x^2 - 400x + 4000 + 2550 = 0$$

$$5x^2 - 400x + 6550 = 0 \qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$5(x^2 - 80x + 1310) = 0$$

Solve $x^2 - 80x + 1310 = 0$ $\qquad \therefore x \doteq 22.97$ or $x \doteq 57.029$

$$x^2 - 80x + 1600 - 1600 + 1310 = 0$$

$$(x-40)^2 - 290 = 0$$

$$(x-40)^2 = 290$$

$$x - 40 = \pm\sqrt{290}$$

$$x = 40 \pm \sqrt{290}$$

$$x \doteq 57.029 \text{ or } x \doteq 22.97$$

Today's Learning Goal(s):

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

a) determine the equation of the inverse of a quadratic function.

3.3 The Inverse of a Quadratic Function   Date: _Mon.9/18_

Recall: The inverse of a function undoes a function.
        To find the equation, switch the x and y variables and rearrange for y.
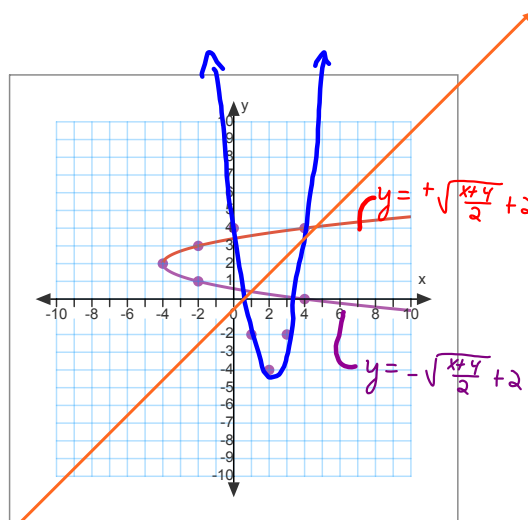   For a function with coordinates (x, y), the inverse will have coordinates (y, x).

Ex. 1:
a) Graph $f(x) = 2(x - 2)^2 - 4$ and its inverse. $f(x): v(2,-4)$

$$(2,-4) \rightarrow (-4,2)$$
$$(3,-2) \rightarrow (-2,3)$$
$$(4,4) \rightarrow (4,4)$$
$$(1,-2) \rightarrow (-2,1)$$
$$(0,4) \rightarrow (4,0)$$

b) Is the inverse a function?

No, it fails VLT.

$y = +\sqrt{\frac{x+4}{2}} + 2$

$y = -\sqrt{\frac{x+4}{2}} + 2$

c) Determine the equation of the inverse.

$$y = 2(x-2)^2 - 4 \qquad x = 2(y-2)^2 - 4$$

$$\frac{x+4}{2} = \frac{2(y-2)^2}{2}$$

$$\frac{x+4}{2} = (y-2)^2$$

$$\pm\sqrt{\frac{x+4}{2}} = \sqrt{(y-2)^2}$$

$$\pm\sqrt{\frac{x+4}{2}} = y - 2$$

$$y = \pm\sqrt{\frac{x+4}{2}} + 2$$

d) Determine the Domain and Range of $f(x)$ and the inverse.

$$D: \{x \in \mathbb{R}\}$$
$$R: \{y \in \mathbb{R} \mid y \geq -4\}$$

inverse
$$D: \{x \in \mathbb{R} \mid x \geq -4\}$$
$$R: \{y \in \mathbb{R}\}$$

Today's Homework Practice includes:

pp. 160-162 #1 – 5, 7, 9, 13 [17]

p.157 Ex.2

3.3 The Inverse of a Quadratic Function

Recall: The inverse of a function undoes a function. To find the equation, switch the x- and y-variables and rearrange for y. For a function with coordinates (x, y), the inverse will have coordinates (y, x).

Eg. 1) Given the quadratic function $f(x) = 2(x + 3)^2 - 4$, graph f(x) and it's inverse. Also determine the equation of the inverse.
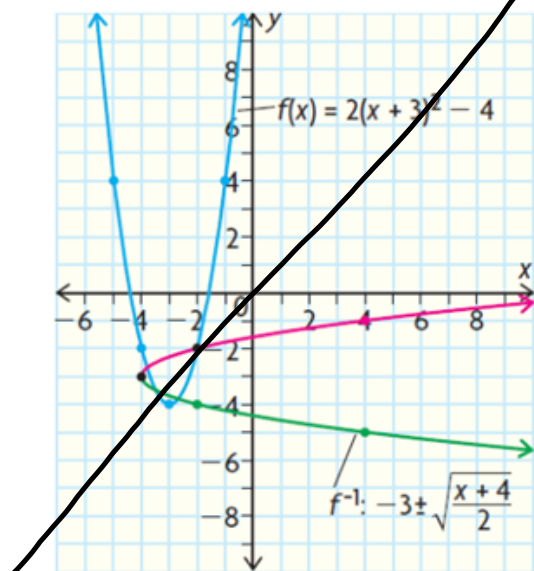
$$f(x) = 2(x + 3)^2 - 4 \longleftarrow$$

$$y = 2(x + 3)^2 - 4$$

$$x = 2(y + 3)^2 - 4$$

$$x + 4 = 2(y + 3)^2$$

$$\frac{x + 4}{2} = (y + 3)^2$$

$$\pm \sqrt{\frac{x + 4}{2}} = y + 3$$

$$-3 \pm \sqrt{\frac{x + 4}{2}} = y$$