Clarify Inverse question using next screen!!

Last day's work:

pp. 177-178 #1ac, 2ac, 4ace, 5, 6ac, 9, 10, 13

a

p. 177 #4ce

4. i) For each equation, decide on a strategy to solve it and explain why you chose that strategy.

ii) Use your strategy to solve the equation. When appropriate, leave your answer in simplest radical form.

a) $2x^2 - 3x = x^2 + 7x$

b) $4x^2 + 6x + 1 = 0$

c) $x^2 + 4x - 3 = 0$

d) $(x + 3)^2 = -2x$

e) $3x^2 - 5x = 2x^2 + 4x + 10$

f) $2(x + 3)(x - 4) = 6x + 6$

Ask me to Explain this method vs. using Q.R.F.

c) $x^2+4x-3=0$

$x^2+4x+4-4-3=0$

$(x+2)^2-7=0$

$(x+2)^2=7$

$x+2=\pm\sqrt{7}$

$\therefore x=-2+\sqrt{7}$

or $x=-2-\sqrt{7}$

Compare to Q.R.F.

e) $3x^2-5x=2x^2+4x+10$

$3x^2-2x^2-5x-4x-10=0$

$x^2-9x-10=0$

$(x-10)(x+1)=0$

$\therefore x=10$ or $x=-1$

p. 177

5. Locate the x-intercepts of the graph of each function.

a) $f(x) = 3x^2 - 7x - 2$

x-intercepts, let $y=0$ [or $f(x)=0$]

$0=3x^2-7x-2$

$a=3$ $b=-7$ $c=-2$

$x=\dfrac{-(-7)\pm\sqrt{(-7)^2-4(3)(-2)}}{2(3)}$

$=\dfrac{7\pm\sqrt{49+24}}{6}$

$=\dfrac{7\pm\sqrt{73}}{6}$

$x=\dfrac{7+\sqrt{73}}{6}$ or $x=\dfrac{7-\sqrt{73}}{6}$

$\doteq 2.590$ $\doteq 0.257$

$\doteq 2.59$ $\doteq 0.26$

p. 178 #10

10. The sum of the squares of two consecutive integers is 685. What could the integers be? List all possibilities.

Let x represent the first consecuve integer.

Let $x+1$ represent the second consecuve integer.

$(1st)^2+(2nd)^2=685$

$(x)^2+(x+1)^2=685$

$x^2+x^2+2x+1=685$

$2x^2+2x+1-685=0$

$2x^2+2x-684=0$

$2(x^2+x-342)=0$

$2(x+19)(x-18)=0$

$\therefore x=-19$ or $x=18$

if $x=-19$, then $x+1$
$=-19+1$
$=-18$

$\therefore$ the consecutive integers are -19 and -18

* if $x=18$, then $x+1$
$=18+1$
$=19$

$\therefore$ the consecutive integers are 18 and 19.

* make sure you understand this; it comes up a lot in various forms.

p. 161 #4c,d $f(x) = -2(x-1)^2 + 7 \;; x \geq 1$

$$y = -2(x-1)^2 + 7$$

$$y = 7 - 2(x-1)^2$$

4. Given $f(x) = 7 - 2(x-1)^2, x \geq 1$, determine

a) $f(3)$ b) $f^{-1}(x)$ c) $f^{-1}(5)$ d) $f^{-1}(2a+7)$

$x = 7 - 2(y-1)^2 \;; y \geq 1$

$x - 7 = -2(y-1)^2 \;; y \geq 1$

$\frac{x-7}{-2} = (y-1)^2 \;; y \geq 1$

$+\sqrt{\frac{x-7}{-2}} + 1 = y \;; y \geq 1$

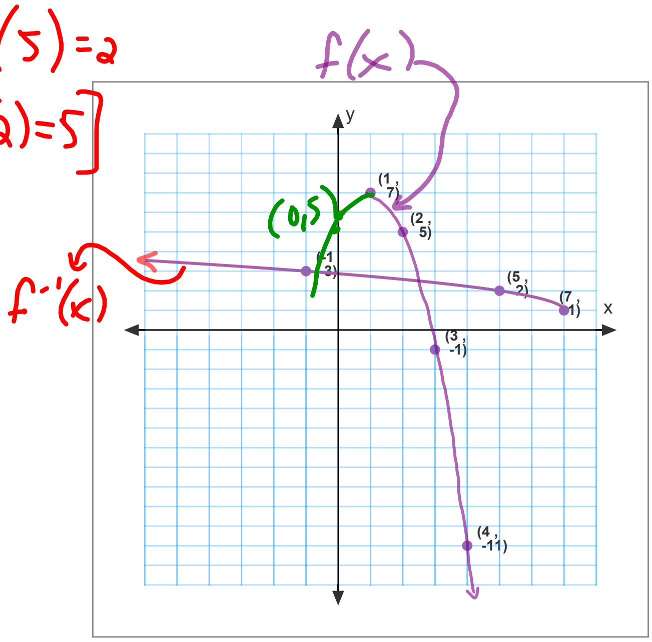
$\therefore f^{-1}(x) = +\sqrt{\frac{x-7}{-2}} + 1 \;; y \geq 1$

or $f^{-1}(x) = 1 + \sqrt{\frac{x-7}{-2}}$

$= 1 + \sqrt{\frac{7-x}{2}}$ etc.

$f^{-1}(5) = 2$

$[\therefore f(2) = 5]$



d) $f^{-1}(2a+7)$

$= 1 + \sqrt{\frac{(2a+7)-7}{-2}}$

$= 1 + \sqrt{\frac{2a}{-2}}$

$= 1 + \sqrt{-a}$ $[\therefore a \leq 0]$

$$y = \sqrt{\frac{x-7}{-2}} + 1$$

p. 161 #7

7. Given $f(x) = -(x+1)^2 - 3$ for $x \geq -1$, determine the equation for $f^{-1}(x)$. Graph the function and its inverse on the same axes.

$$y = -(x+1)^2 - 3$$

$f(x) = -(x+1)^2 - 3 \;; x \geq -1$

$x = -(y+1)^2 - 3 \;; y \geq -1$

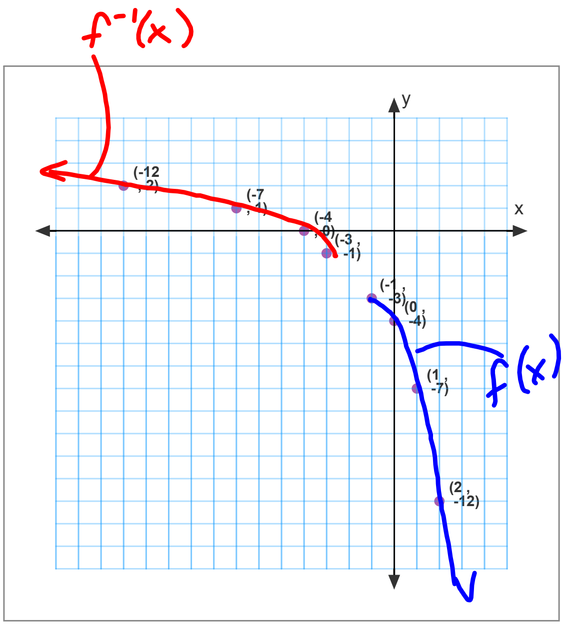
$x + 3 = -(y+1)^2$

$-(x+3) = (y+1)^2$

$+\sqrt{-(x+3)} = y + 1$

$\therefore y = +\sqrt{-(x+3)} - 1 \;; y \geq -1$

or $f^{-1}(x) = +\sqrt{-(x+3)} - 1$



Today's Learning Goal(s):

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

a) classify the nature of the roots of a quadratic equation using the discriminant.
b) use the discriminant in problem solving situations.

3.6 The Zeros of a Quadratic Function

Date: Mar. 21/18

Ex. 1: Find the zeros of the following using the quadratic formula.

a) $f(x) = 2x^2 - 5x - 3$

$a=2 \quad b=-5 \quad c=-3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-3)}}{2(2)}$$

$$= \frac{5 \pm \sqrt{25+24}}{4}$$

$$= \frac{5 \pm \sqrt{49}}{4}$$

$$= \frac{5 \pm 7}{4}$$

$$x = \frac{5+7}{4} \text{ or } x = \frac{5-7}{4}$$

$$= \frac{12}{4} \qquad = \frac{-2}{4}$$

$$= 3 \qquad = -\frac{1}{2}$$

$\therefore$ the zeros are: 3 and $-\frac{1}{2}$

b) $g(x) = 2x^2 - 12x + 18$

$a=2 \quad b=-12 \quad c=18$

$$x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(2)(18)}}{2(2)}$$

$$= \frac{12 \pm \sqrt{144-144}}{4}$$

$$= \frac{12 \pm \sqrt{0}}{4}$$

$x = 3$

$\therefore$ the zeros are 3 (or 3)

c) $h(x) = 2x^2 - 4x + 5$

$a=2 \quad b=-4 \quad c=5$

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(2)(5)}}{2(2)}$$

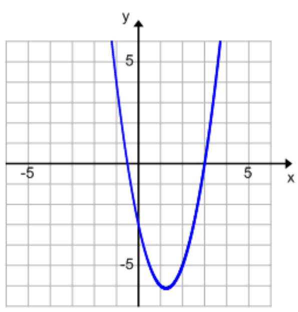
$$= \frac{4 \pm \sqrt{16-40}}{4}$$

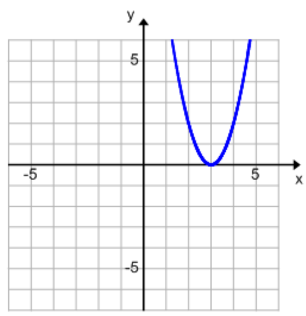
$$= \frac{4 \pm \sqrt{-24}}{4}$$

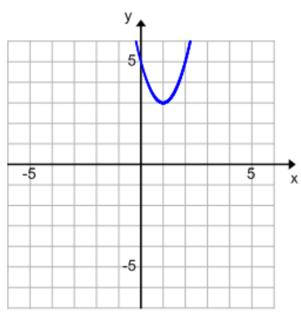
$\therefore$ No Real Roots

(No Real zeros)

click on the graphs







The Discriminant

For $ax^2+bx+c=0$ or for $f(x)=ax^2+bx+c$
If $b^2-4ac>0$, there are 2 solutions/zeros.
If $b^2-4ac=0$, there is 1 solution/zeros.
If $b^2-4ac<0$, there are no solutions/zeros.

Ex. 2: Determine the number of zeros for $f(x)=-3x^2+6x-3$
What is the "nature of the roots" for $0=-3x^2+6x-3$?

$a=-3$ $b=6$ $c=-3$

b^2-4ac

$=(6)^2-4(-3)(-3)$

$=36-36$

$=0$

$\because b^2-4ac=0$

$\therefore$ there is 1 solution.

$\vdots$

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$\because b^2-4ac>0$

$\therefore$ there are 2 solutions

Ex. 3: For what values of k will the function $f(x) = 2x^2 + 4x + k$ have:

$a=2 \quad b=4 \quad c=k$

a) 1 zero?

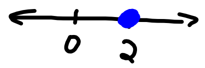
$b^2-4ac=0$

$(4)^2-4(2)(k)=0$

$16-8k=0$

$-8k=-16$

$k=2$



b) 2 zeros?

$b^2-4ac>0$

$(4)^2-4(2)k>0$

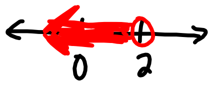
$16-8k>0$

$16>8k \qquad -8k>-16$

$\frac{16}{8}>k \qquad k<\frac{-16}{-8}$

$2>k \qquad k<2$

$k<2$



c) no zeros?

$b^2-4ac<0$

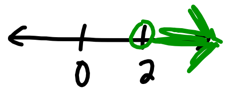
$(4)^2-4(2)k<0$

$16-8k<0$

$-8k<-16$

$k>\frac{-16}{-8}$

$k>2$



Inequality Rules?

Ex. 4: For what value(s) of k will the function $g(x) = kx^2 + 8x + k$ have no real roots?

$a=k \quad b=8 \quad c=k$

$$b^2-4ac<0$$
$$8^2-4(k)(k)<0$$
$$64-4k^2<0$$
$$-4(k^2-16)<0$$
$$-4(k+4)(k-4)<0$$

Think: for LS <0, then both brackets must be positive. So, what value(s) of k will make the brackets positive.

For k+4>0 then k>–4
For k–4>0, then k>4 $\Big\}$ and $\cap$

$k>4$

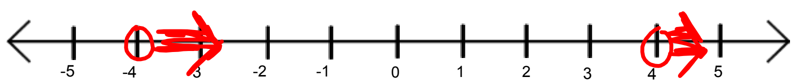
OR

For k+4<0 then k<–4
For k–4<0 then k<4

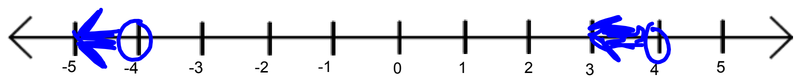
$k<-4$

Since both brackets have to be positive or negative AT THE SAME TIME, then the value(s) of k have to "work" for both brackets. This is easiest to see on a number line.

Both pos:

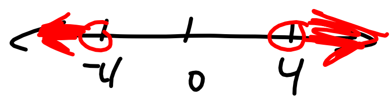


Both neg:



if k>4 <u>**or**</u> k<–4, the function will have no real roots.

$\cup$



Today's Homework Practice includes:

pp. 185-186 #1bde, 3ac, 4ac, 6, 7 [14,17,18]