§8.1 #45

$4y^2 - 12y - 2 = 0$

$\frac{4y^2}{4} - \frac{12y}{4} - \frac{2}{4} = \frac{0}{4}$

$y^2 - 3y - \frac{1}{2} = 0$

$y^2 - 3y \quad = \frac{1}{2}$

$\frac{3}{2} \longrightarrow \left(\frac{3}{2}\right)^2 = \frac{3^2}{2^2} = \frac{9}{4}$

$y^2 - 3y + \left(\frac{3}{2}\right)^2 = \frac{1}{2} + \frac{9}{4}$

$\left(y - \frac{3}{2}\right)^2 = \frac{11}{4}$

$y - \frac{3}{2} = \pm\sqrt{\frac{11}{4}} = \pm\frac{\sqrt{11}}{\sqrt{4}} = \pm\frac{\sqrt{11}}{2}$

$y = \frac{3}{2} \pm \frac{\sqrt{11}}{2} = \frac{3 \pm \sqrt{11}}{2}$

$\left\{ \frac{3 \pm \sqrt{11}}{2} \right\}$

$4y^2 - 12y \quad = 2$

$\frac{4y^2}{4} - \frac{12y}{4} \quad = \frac{2}{4}$

$\frac{1}{2} + \frac{9}{4} =$

$\frac{1}{2} + \frac{9}{2 \cdot 2} =$

$\frac{1}{2} \cdot \frac{2}{2} + \frac{9}{2 \cdot 2} = \frac{2 + 9}{2 \cdot 2} = \frac{11}{4}$

$\frac{1}{2} + \frac{9}{4} = \frac{1}{2} \cdot \frac{2}{2} + \frac{9}{4} = \frac{2+9}{4}$

#21 $\sqrt{-16} = i\sqrt{16} = i \cdot 4 = 4i$

$\sqrt{-16} \rightarrow 4i$

§8.2 Quadratic Formula

Recall: $A^2 = B \Longrightarrow A = \pm\sqrt{B}$

(from $\sqrt{A^2} = |A|$ & $|A| = \sqrt{B}$, then $A = \sqrt{B}$ OR $A = -\sqrt{B}$)

$x^2 + bx + c = 0$

$x^2 + bx = -c$

$\frac{b}{2} \rightarrow \left(\frac{b}{2}\right)^2 = \frac{b^2}{4}$

$x^2 + bx + \left(\frac{b}{2}\right)^2 = -c + \frac{b^2}{4}$

$\left(x + \frac{b}{2}\right)^2 = \frac{-4c + b^2}{4}$, etc.

when leading coefficient is 1.

Solve $ax^2+bx+c=0$

$ax^2+bx+c=0$ Divide by a

$x^2+\frac{b}{a}x+\frac{c}{a}=0$

$x^2+\frac{b}{a}x = -\frac{c}{a}$

$\frac{\frac{b}{a}}{2} = \frac{b}{a}\cdot\frac{1}{2} = \frac{b}{2a} \longrightarrow \left(\frac{b}{2a}\right)^2 = \frac{b^2}{(2a)^2} = \frac{b^2}{2^2a^2} = \frac{b^2}{4a^2}$

$x^2+\frac{b}{a}x+\left(\frac{b}{2a}\right)^2 = -\frac{c}{a}+\frac{b^2}{4a^2} = \frac{b^2-4ac}{4a^2}$

4a for ay

$\frac{b^2}{4a^2} - \frac{c}{a}\cdot\frac{4a}{4a} = \frac{b^2-4ac}{4a^2}$

$\left(x+\frac{b}{2a}\right)^2 = \frac{b^2-4ac}{4a^2}$

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

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

* assume $a>0$

$\sqrt{4a^2} = 2|a| = 2a$ if $a>0$

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

$ax^2+bx+c=0 \Longrightarrow$

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

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

$a=2,\ b=9,\ c=10$

$b^2-4ac=9^2-4(2)(10)=81-80=1$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}=\frac{-9\pm\sqrt{1}}{2(2)}=\frac{-9\pm 1}{4}$$

$\frac{-9+1}{4}=\frac{-8}{4}=-2$

$\frac{-9-1}{4}=-\frac{10}{4}=-\frac{5}{2}$

$\{-\frac{5}{2},-2\}$

Check

$2(-\frac{5}{2})^2+9(-\frac{5}{2})+10$

$=2(\frac{25}{4})-\frac{45}{2}+10$

$=\frac{50}{4}-\frac{45}{2}+10$

$=\frac{25}{2}-\frac{45}{2}+10$

$=\frac{-20}{2}+10=-10+10=0$ ✓

$2(-2)^2+9(-2)+10$

$=2(4)-18+10$

$=8-18+10=0$

Divide by x+2. See if R=0

-2	2	9	10
		-4	-10
	2	5	0 = f(-2)

By Remainder Theorem and Synthetic Division.

$2x^2 - 6x - 1 = 0$

$a = 2,\ b = -6,\ c = -1$

$b^2 - 4ac = (-6)^2 - 4(2)(-1)$

$= 36 + 8$

$= 44$

$2 \,\underline{|\, 44}$
$2 \,\underline{|\, 22}$
11

$\sqrt{44} = \sqrt{2^2 \cdot 11} = 2\sqrt{11}$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-6) \pm 2\sqrt{11}}{2(2)} = \frac{6 \pm 2\sqrt{11}}{4}$$

GCF of numerator is: 2

$$= \frac{\cancel{2}(3 \pm 1\sqrt{11})}{\cancel{2} \cdot 2} = \frac{3 \pm \sqrt{11}}{2}$$

Common Error costs double

$$\frac{\overset{3}{\cancel{6}} \pm 2\sqrt{11}}{\underset{2}{\cancel{4}}} = \frac{3 \pm \overset{1}{\cancel{2}}\sqrt{11}}{\underset{1}{\cancel{2}}} = 3 \pm \sqrt{11}$$

$\sqrt{\text{Positive}}$ is real

$\sqrt{\text{Negative}}$ is imaginary

$\sqrt{0}$ is 0

Always do 1st

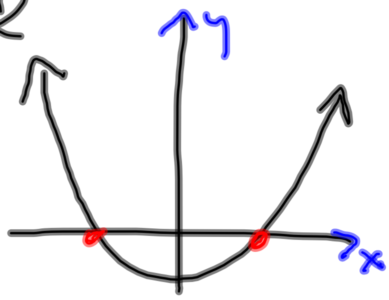
Discriminant

b^2-4ac is

	# solutions	b^2-4ac is
$x = \dfrac{-b \pm \sqrt{\text{Positive}}}{2a}$	2 real	Positive
$x = \dfrac{-b \pm \sqrt{\text{Negative}}}{2a}$	2 nonreal	Negative
$x = \dfrac{-b \pm \sqrt{\text{zero}}}{2a}$	1 real	Zero

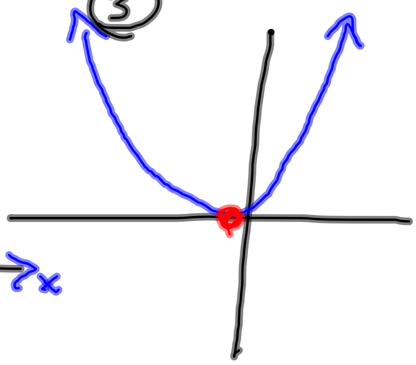
Nov 23-9:47 AM

① $b^2-4ac>0$



② $b^2-4ac<0$

③ $b^2-4ac=0$



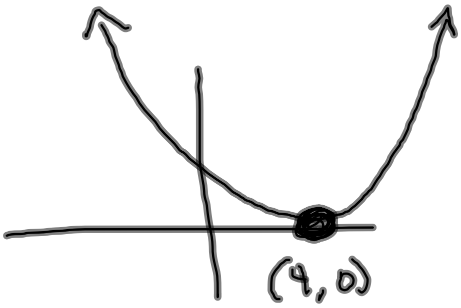
③ $x^2-8x+16=0$ Perfect square trinomial

$\frac{8}{2}=4 \rightarrow 4^2=16$

$(x-4)^2=0$

$x-4=\pm\sqrt{0}=0$

$x=4$



$a=1,\ b=-8,\ c=16$

$b^2-4ac=(-8)^2-4(1)(16)$

$=64-64=0$

one real solution!

Nov 23-9:53 AM

3 ways to solve: $2x^2+7x+5=0$

Factors: $(2x+5)(x+1)=0$

$2x+5=0$ $\quad$ $x+1=0$

$2x=-5$ $\quad$ $x=-1$

$x=-\frac{5}{2}$

Complete the Square:

$2x^2+7x+5=0$

$x^2+\frac{7}{2}x = -\frac{5}{2}$

$x^2+\frac{7}{2}x+\left(\frac{7}{4}\right)^2=-\frac{5}{2}+\frac{49}{16}=\frac{-40+49}{16}=\frac{9}{16}$

$\left(x+\frac{7}{4}\right)^2=\frac{9}{16}$

$x+\frac{7}{4}=\pm\sqrt{\frac{9}{16}}=\pm\frac{3}{4}$

$x=\frac{-7\pm 3}{4}=$ $\frac{-4}{4}=-1$; $\frac{-10}{4}=-\frac{5}{2}$

§8.2 #s 1-21, every 4th, 23, 25, 27, 29, 33, 35, 51
Due Tuesday

Nov 23-10:01 AM