

121 Writing Project #1 SPRING, 2017

①  $x^2 + 7x - 18 = 0$        $a=1, b=7, c=-18$   
 $(x+9)(x-2) = 0$        $b^2 - 4ac = (7)^2 - 4(1)(-18)$   
 $\boxed{x \in \{-9, 2\}}$        $= 49 + 72 = 121$   
 $x = \frac{-7 \pm \sqrt{121}}{2(1)} = \frac{-7 \pm 11}{2}$

② Weren't supposed to do by factoring

$x = \frac{-7+11}{2} = 2$   
 $x = \frac{-7-11}{2} = -9$

②  $5.89x^2 - 13.09x + 7.26 = 0$

$589x^2 - 1309x + 726 = 0$

$a=589, b=-1309, c=726$

$b^2 - 4ac = (-1309)^2 - 4(589)(726)$

$= 3025$  &  $\sqrt{3025} = 55, \text{ so}$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{1309 \pm 55}{2(589)} = \frac{22}{19}$   
 $\approx 1.157894737$   
 OR

$x \in \left\{ \frac{22}{19}, \frac{33}{31} \right\}$   
 WANT 4-decimal-place

$= \frac{33}{31}$

$\approx 1.064516129$

answer:

$\boxed{x \in \{1.0645, 1.1579\}}$



3)  $25x^2 - 20x + 7 = 0$

$a=25, b=-20, c=7$

$b^2 - 4ac = (-20)^2 - 4(25)(7)$   
 $= 400 - 700 = -300$

$\sqrt{-300} = 10\sqrt{-3} = 10i\sqrt{3}$

$x = \frac{20 \pm 10i\sqrt{3}}{2(25)} = \frac{4 \pm 2i\sqrt{3}}{2(5)}$

$x \in \left\{ \frac{2 \pm i\sqrt{3}}{5} \right\}$

Issues w/  
1st draft

4)  $3mx^2 - 2wx + 5r = 0$

$a=3m, b=-2w, c=5r$

$b^2 - 4ac = (-2w)^2 - 4(3m)(5r)$   
 $= 4w^2 - 60mr$

$x = \frac{2w \pm \sqrt{4w^2 - 60mr}}{6m}$

$= \frac{2w \pm 2\sqrt{w^2 - 15mr}}{6m}$

$= \frac{w \pm \sqrt{w^2 - 15mr}}{3m}$

Issues

FINAL ANS

121 WP #1

$$(5) \quad x^2 + 7x - 18 = 0$$

$$(x+9)(x-2) = 0$$

$$x \in \{-9, 2\}$$

$$(6) \quad 589x^2 - 1309x + 726 = 0$$

$$a = 589, b = -1309, c = 726$$

$$\Rightarrow x = \frac{1309 \pm 55}{2(589)}$$



$$b^2 - 4ac =$$

$$(-1309)^2 - 4(589)(726)$$

$$= 3025$$

$$\sqrt{3025}$$

$$\frac{1309 + 55}{2(589)}$$

$$\frac{1364}{2(589)}$$

$$= \frac{682}{589}$$

$$= \frac{2(11)(31)}{(19)(31)}$$

$$2 \overline{) 682}$$

$$\underline{11 \overline{) 341}}$$

$$31$$

$$19 \overline{) 589}$$

$$31$$

$$= \boxed{\frac{22}{19} = x}$$

$$\frac{1309 - 55}{2(589)} = \frac{1254}{2(589)}$$

$$2 \overline{) 1254}$$

$$3 \overline{) 627}$$

$$11 \overline{) 209}$$

$$19$$

$$\text{So } \frac{1254}{2(589)} = \frac{2(3)(11)(19)}{2(19)(31)}$$

$$= \boxed{\frac{33}{31} = x}$$

⑥ cont'd We have used the quadratic formula & a lot of pre-algebra skills to show that if

$$589x^2 - 1309x + 726 = 0, \text{ then}$$

$$x \in \left\{ \frac{22}{19}, \frac{33}{31} \right\}. \text{ This means}$$

$$589x^2 - 1309x + 726$$

$$= 589 \left( x - \frac{22}{19} \right) \left( x - \frac{33}{31} \right)$$

1.157894737

$$= (19)(31) \left( x - \frac{22}{19} \right) \left( x - \frac{33}{31} \right)$$

1.064516129

$$= 19 \left( x - \frac{22}{19} \right) (31) \left( x - \frac{33}{31} \right)$$

$$= (19x - 22)(31x - 33) = \text{FACTORED FORM!}$$

So you CAN reverse-engineer the factored form FROM quadratic formula results!

121 VP #1

⑥ cont'd It's painful, but it's a sledgehammer for the big uglies, when you need a factored form. And you WILL need factored form in Chapter 3 & in Calculus II.

$$\textcircled{7} \quad x^2 + 7x - 18 = 0$$

$$x^2 + 7x = 18$$

$$\left(\frac{7}{2}\right)^2 = \frac{49}{4}$$

$$x^2 + 7x + \left(\frac{7}{2}\right)^2 = 18 + \frac{49}{4} = \frac{72 + 49}{4} = \frac{121}{4}$$

$$\left(x + \frac{7}{2}\right)^2 = \frac{121}{4}$$

$$x + \frac{7}{2} = \pm \sqrt{\frac{121}{4}} = \pm \frac{11}{2}$$

$$x = -\frac{7}{2} \pm \frac{11}{2} \begin{cases} \frac{4}{2} = 2 \\ -\frac{18}{2} = -9 \end{cases}$$

$$\Rightarrow \boxed{x \in \{-9, 2\}}$$

121 WP # 1

$$(8) \quad x^2 - 24x - 9 = 0$$

$$x^2 - 24x = 9$$

$$\frac{24}{2} = 12 \rightarrow 12^2 = 144$$

$$\begin{array}{r} 3 \overline{)153} \\ 3 \overline{)51} \\ 17 \end{array}$$

$$x^2 - 24x + 12^2 = 9 + 144$$

$$(x - 12)^2 = 153$$

$$x - 12 = \pm \sqrt{153} = \pm \sqrt{3 \cdot 3 \cdot 17} = \pm 3\sqrt{17}$$

$$x = 12 \pm 3\sqrt{17}$$

$$\boxed{x \in \{12 \pm 3\sqrt{17}\}}$$

$$(9) \quad 5x^2 + 2x + 3 = 0$$

$$x^2 + \frac{2}{5}x + \frac{3}{5} = 0$$

$$x^2 + \frac{2}{5}x = -\frac{3}{5}$$

$$\left(\frac{2}{5}\right)\left(\frac{1}{2}\right) = \frac{1}{5} \rightarrow \left(\frac{1}{5}\right)^2 = \frac{1}{25}$$

$$x^2 + \frac{2}{5}x + \left(\frac{1}{5}\right)^2 = -\frac{3}{5} + \frac{1}{25} = -\frac{3}{5} \cdot \frac{5}{5} + \frac{1}{25}$$

$$\left(x + \frac{1}{5}\right)^2 = -\frac{14}{25}$$

$$= \frac{-15 + 1}{25} = -\frac{14}{25}$$

121 WP # 1

(9) cont'd

$$x + \frac{1}{5} = \pm \sqrt{-\frac{14}{25}} = \pm i \frac{\sqrt{14}}{5}$$

$$x = -\frac{1}{5} \pm i \frac{\sqrt{14}}{5}$$

$$x \in \left\{ -\frac{1}{5} \pm i \frac{\sqrt{14}}{5} \right\}$$

(10)  $4x^2 - 16x + 11 = 0$

$$x^2 - 4x = -\frac{11}{4}$$

$$x^2 - 4x + 2^2 = -\frac{11}{4} + 4 = \frac{-11 + 16}{4} = \frac{5}{4}$$

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

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

$$x = 2 \pm \frac{\sqrt{5}}{2}$$

$$x \in \left\{ 2 \pm \frac{\sqrt{5}}{2} \right\}$$