

MAT1340

Lowley

①. $x^2 + 7x - 18 = 0$

$a=1, b=7, c=-18$

$x = \frac{-7 \pm \sqrt{7^2 - 4 \times 1 \times (-18)}}{2 \times 1}$

$7^2 = 49$
 $-4 \times 1 = -4$
 $-4 \times -18 = 72$

Do this and

$x = \frac{-7 \pm \sqrt{49 + 72}}{2}$

$49 + 72 = 121$

Plug it right in at this step

$x = \frac{-7 \pm \sqrt{121}}{2}$

$\sqrt{121} = 11$

$x = \frac{-7 \pm 11}{2}$

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

$-7 + 11 = 4$

$\frac{4}{2} = 2 \quad x=2$

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

$-7 - 11 = -18$

$\frac{-18}{2} = -9 \quad x=-9$

$x=2$
 $x=-9$

* Style Note *

Write multiple values of x as a set.

ie: $x = -9, 2$ OR $x \in \{-9, 2\}$
from small \rightarrow big

$\frac{36}{50}$

-1

-1

MAT 1340

②. $5.89x^2 - 13.09x + 7.26 = 0$

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

good! $\frac{589}{100}x^2 - \frac{1309}{100}x + \frac{363}{50} = 0$
 $x = \frac{-(-1309) \pm \sqrt{(-1309)^2 - 4 \times 589 \times 726}}{2 \times 589}$

$x = \frac{1309 \pm \sqrt{1309^2 - 1710456}}{1178}$

$x = \frac{1309 \pm \sqrt{3025}}{1178}$

$x = \frac{1309 \pm 55}{1178}$

$x = \frac{1309 + 55}{1178}$

$x = \frac{1309 - 55}{1178}$

$x \neq 1.1579$
 \approx
 or
 $x \neq 1.0645$
 \approx

$-4 \times 589 = -2,356$
 $-2,356 \times 726 = -1,710,456$
 $2 \times 589 = 1,178$
 $1309^2 = 1,713,481$ Find This
 $1,713,481 - 1,710,456 = 3025$ then
 $\sqrt{3025} = 55$ jump to here

$1309 + 55 = 1364$

$\frac{1364}{1178} = 1.1579$

Exact \approx Rounded

$1309 - 55 = 1254$

$\frac{1254}{1178} = 1.0645$

"=" means "exact". Whenever there is rounding involved, use " \approx " instead.

MAT1340

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

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

$$x = \frac{-(-20) \pm \sqrt{(-20)^2 - 4 \times 25 \times 7}}{2 \times 25}$$

$$x = \frac{20 \pm \sqrt{400 - 700}}{50}$$

$$x = \frac{20 \pm \sqrt{-300}}{50}$$

$$x = \frac{20 \pm 10\sqrt{3}i}{50}$$

$$x = \frac{20 + 10\sqrt{3}i}{50}$$

$$x = \frac{20 - 10\sqrt{3}i}{50}$$

the "i" should be outside of the radical, bring it out front

$-\frac{1}{2}$

$$-4 \times 25 = -100$$

$$-100 \times 7 = -700$$

$$-20^2 = 400$$

$$2 \times 25 = 50$$

$$400 - 700 = -300$$

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

Simplified =

$$x = \frac{2}{5} + \frac{\sqrt{3}}{5}i$$

or

$$x = \frac{2}{5} - \frac{\sqrt{3}}{5}i$$

Style Note

Stop here and reduce

$$\text{ie: } x = \frac{2 \pm 10i\sqrt{3}}{50} = \boxed{\frac{2 \pm i\sqrt{3}}{5}}$$

$-\frac{1}{2}$

MAT 1340

④. $3mx^2 - 2wx + 5r = 0$

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

~~1/3~~ $\frac{3x^2}{3x^2} = \frac{2wx - 5r}{3x^2}$

$x = \frac{2wx - 5r}{3x^2}, x = \emptyset$

Creative, but no.
 move the expression to
 the right.

~~Divide by $3x^2$~~

$$x = \frac{w \pm \sqrt{4(w^2 - 15mr)}}{3m} - 5$$

⑤. $x^2 + 7x - 18 = 0$

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

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

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

→ $x = -9$
 one more step each ...
 → $x = 2$

... and put into a set.

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

MAT1340

⑥. $589x^2 - 1309x + 726 = 0$ *Factor -2*

Insert miracles here

$$19 \times (31x - 33) - 22(31x - 33) = 0$$

$$(31x - 33)(19x - 22) = 0$$

$589x^2 - 627x - 682x + 726 = 0$

$(31x - 33)$ cancels

no quad. formula, no guesses... how/why these numbers?

$31x - 33 = 0$

$19x - 22 = 0$

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

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

⑦. $x^2 + 7x - 18 = 0$

move right

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

$$\frac{7^2}{2} = \frac{49}{4}$$

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

$$18 \times 4 = 72$$

$$x^2 + 7x + \frac{49}{4} = 18 + \frac{49}{4}$$

$$72 + 49 = 121$$

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

Solve for x

$$x = -9$$

$$x = 2$$

Missing a good chunk here

-2

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

$$\sqrt{\frac{121}{4}} = \frac{11}{2}$$

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

$$\left| x = \frac{-7 \pm 11}{2} \right| \Rightarrow x = -9, 2$$

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⑧. $x^2 - 24x - 9 = 0$

$$\left(\frac{24}{2}\right)^2$$

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

$$12^2 = 144$$

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

$$9 + 144 = 153$$

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

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

simplify

$$x = -3\sqrt{17} + 12$$

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

Show what happens next, missing a step or two. $-\frac{1}{2}$

style Put "+" on the right and leave combined ie: $x = 12 \pm 3\sqrt{17}$

⑨. $5x^2 + 2x + 3 = 0$

$$\frac{2}{5}^2 = \frac{1}{25}$$

$$5x^2 + 2x = -3$$

~~5x^2 + 2x = -3~~

$$x^2 + \frac{2}{5}x + \frac{1}{25} = -\frac{3}{5} + \frac{1}{25}$$

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

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

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

style Leave combined like...

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

$-\frac{1}{2}$

MAT 1340

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

$$\frac{16}{4} = 4$$

$$4x^2 - 16x = -11$$

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

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

$$\begin{aligned} x &= -\frac{\sqrt{5}}{2} + 2 \\ x &= \frac{\sqrt{5}}{2} + 2 \end{aligned}$$

~~style~~

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

it's less
to write too!