MAT1340 Writing Project #1 Will Hamilton

① $x^2+7x-18=0$

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

$7^2-4(1)(-18)$

$49+72$

121

44.5/50

$$\frac{-7\pm\sqrt{121}}{2(1)}=\frac{-7\pm\sqrt{121}}{2}$$

$$\frac{-7+11}{2} \qquad \frac{-7-11}{2}$$

$$\frac{4}{2} \qquad \frac{-18}{2}$$

$2, -9$

$\boxed{\begin{array}{l} x=2 \\ x=-9 \end{array}}$

Style Note
Put final answers like this into set form like...

$x = -9, 2$

or

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

-0

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$a=5.89$ $b=-13.09$ $c=7.26$

② $5.89x^2-13.09x+7.26=0$

b^2-4ac

$(13.09)^2-4(5.89)(7.26)$

$=.3025$

$\frac{13.09\pm\sqrt{.3025}}{2(5.89)}$

$\frac{13.09+\sqrt{.3025}}{11.78}$

$x\neq 1.1579$ ≈

$\frac{13.09-\sqrt{.3025}}{11.78}$ $-\frac{1}{2}$

$x\neq 1.0645$ ≈ -1

make sure the radical "√" covers everything that goes under it.

"=" is exact. These decimals are rounded, so "≈" is used.

-1.5

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$a=25 \quad b=-20 \quad c=7$

③ $25x^2-20x+7=0$

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

b^2-4ac

$(-20)^2-4(25)(7)$

$400-700$

$=-300$

$$\frac{20\pm\sqrt{-300}}{2(25)}$$

$$\frac{20\pm\sqrt{-300}}{50} = \frac{20\pm i\sqrt{300}}{50} \quad -\frac{1}{2}$$

Nice, properties of sq. roots! ☺

$$= \frac{20\pm i\sqrt{100}\sqrt{3}}{50} = \frac{20\pm 10i\sqrt{3}}{50}$$

$$= \frac{\cancel{20}^{2}}{\cancel{50}_{5}} \pm \frac{\cancel{10}^{1} i\sqrt{3}}{\cancel{50}_{5}}$$

$$\boxed{= \frac{2}{5} \pm \frac{i\sqrt{3}}{5}}$$

Style

Don't split this up!

Since it all has LCD = 5, keep it as one fraction like...

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

OR

$$x \in \left\{ \frac{2\pm i\sqrt{3}}{5} \right\} \quad -\frac{1}{2}$$

MAT1340 $a=3m$ $b=-2w$ $c=5r$

④ $3mx^2-2wx+5r=0$

$$\frac{2w \pm \sqrt{4w^2-60mr}}{2(3m)}$$

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

b^2-4ac

$(-2w)^2-4(3m)(5r)$

$4w^2-60mr$

not quite there yet...

leave the 4 out to factor it.

$$\frac{2w \pm \sqrt{4w^2-4(15mr)}}{6m} = \frac{2w \pm \sqrt{4(w^2-15mr)}}{6m}$$

$$= \frac{\cancel{2}w \pm \cancel{2}\sqrt{w^2-15mr}}{\cancel{6}_3 m} = \boxed{\frac{w \pm \sqrt{w^2-15mr}}{3m}}$$

MAT1340

⑤ $x^2+7x-18=0$

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

$\boxed{x=2 \quad x=-9}$ ✓

-0

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⑥ $589x^2-1309x+726=0$

$a=589 \quad b=1309 \quad c=726$

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

$=3025$

$$\frac{1309 \pm \sqrt{3025}}{1178} \qquad = \frac{1309 \pm 55}{1178}$$

$$= \frac{1364}{1178} = \frac{22}{19} \qquad \frac{1254}{1178} = \frac{33}{31}$$

Factored Form

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

$\boxed{x=\frac{22}{19} \quad x=\frac{33}{31}}$

These do not equal each other?

Nevermind. I see it.
Separate w/ a line please.

-0

MAT1340

① $x^2+7x-18=0$

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

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

$x^2+7x+\frac{49}{4}=\frac{72}{4}+\frac{49}{4}$

$x^2+7x+\frac{49}{4}=\frac{121}{4}$

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

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

← Make sure radical is also tall enough so it's clear what goes inside.

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

$-\frac{7}{2}$ $-\frac{7}{2}$

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

$x=\frac{-11}{2}-\frac{7}{2}=\frac{-18}{2}=-9$

$x=2$
$x=-9$

✓

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(8) $x^2 - 24x - 9$

$x^2 - 24x + \left(\frac{24}{2}\right)^2 = 9 + \left(\frac{24}{2}\right)^2$

$x^2 - 24x + (12)^2 = 9 + (12)^2$

$x^2 - 24x + 144 = 153$

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

$\sqrt{(x-12)^2} = \pm\sqrt{153}$

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

$+12 \quad +12$

$x = 12 \pm 3\sqrt{17}$ stop here.

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

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

-0

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

$\frac{5}{5}\quad\frac{2x}{5}\quad\frac{3}{5}$

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

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

$x^2+\frac{2x}{5}+\frac{1}{25}=-\frac{15}{25}+\frac{1}{25}$

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

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

short

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

short ← looks like "$\frac{\sqrt{14}}{25}$"

$-\frac{1}{5}\quad\quad -\frac{1}{2}$

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

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

Can use LCD and leave as ± answer like...

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

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

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

MAT1340

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

$\frac{4x^2}{4} - \frac{16x}{4} + \frac{11}{4} = 0$

$x^2 - \frac{16}{4}x + \frac{11}{4} = 0$

$x^2 - 4x + \frac{11}{4} = 0$

$x^2 - 4x + \left(\frac{4}{2}\right)^2 = -\frac{11}{4} + \left(\frac{4}{2}\right)^2$

$x^2 - 4x + 4 = -\frac{11}{4} + \frac{4}{1} \cdot \frac{4}{4}$

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

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

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

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

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

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

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

Stop Here.

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

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

-0