MAT 1340

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

1) $x^2+7x-18=0$

Not real ??

$b^2-4ac = 7^2-4(1)(-18)$

$= 49+72 = 121 > 0$

$\Rightarrow$ 2 real sol'ns.

-5

2) $5.89x^2-13.09x+7.26=0$

$$\frac{13.09+\sqrt{(-13.09)^2-4\times 5.89\times 7.26}}{2\times 5.89}$$

28/50

$$\frac{13.09-\sqrt{(-13.09)^2-4\times 5.89\times 7.26}}{2\times 5.89}$$

$5.89(x-1.157895)(x-1.064516)=0$

$x \neq 1.158, 1.065$ ← "Round to 4 decimal places" -1

"$=$" means "exact". Any time you have rounded numbers, use "$\approx$". -1

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

$25\left(x^2 - \frac{4}{5}x + \frac{7}{25}\right)$

$25\left(\left(x - \frac{2}{5}\right)^2 - \frac{4}{25} + \frac{7}{25}\right)$

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

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

$x - \frac{2}{5} = \pm\sqrt{-\frac{3}{25}}$

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

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

You can even leave the $\pm$ together

ie: $\frac{2 \pm i\sqrt{3}}{5}$ -1

4) $3m^2 - 2w + 5r = 0$

$-5 \quad -5$

$3m^2 = 2w - 5r$

$m^2 = \frac{2w - 5r}{3}$

$$m = \frac{2w}{3x}, -\frac{5r}{3x^2}$$

$3mx^2 - 2wx + 5r$

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

these... quadratic formula...

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

hint Leave the 4 in "$-4ac$" out so the factoring is easy to see. :)

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

$x^2 + 7x - 18$

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

$\boxed{x = 2, -9}$

Good

6) $589x^2 - 1309x + 726 = 0$ $\quad a = 589 \quad b = -1309 \quad c = 726$

$-b = -(-1309) = +1309$

$$x = \frac{+1309 \pm \sqrt{1309^2 - 4(589)(726)}}{2(589)}$$

$$x = \frac{+1309 \pm \sqrt{1713481 - 1710456}}{1178}$$

$$x \quad \frac{+1309 \pm \sqrt{3025}}{1178}$$

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

$$x = +\frac{1254}{1178} \quad x + \frac{1364}{1178}$$

$\boxed{x = +1.065, +1.158}$

Fractions reduce to

$x = \frac{33}{31}, \frac{22}{19}$

this means...

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

$= (31)(19)(x - \frac{33}{31})(x - \frac{22}{19})$ $\quad -4$

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

Needed to see this factored form.

-4

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7.) $x^2 + 7x - 18 = 0$

leave the "x"

$\left(\frac{7}{2}\right)^2 + 7x - 18 = 0$

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

$\frac{49}{2^2} + 7x - 18 = 0$

$\frac{49}{4} + 7x - 18 = 0$

$7x - \frac{23}{4} = 0$

$x = \frac{\frac{23}{4}}{7}$

$x = \frac{23}{4 \times 7}$

$\boxed{x = \frac{23}{28}}$

$x^2 + 7x + \left(\frac{7}{2}\right)^2 - \frac{49}{4} - 18\left(\frac{4}{4}\right) = 0$

$\left(x + \frac{7}{2}\right)^2 - \frac{121}{4} = 0$

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

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

$= \pm \frac{11}{2}$

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

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8) $x^2 - 24x - 9 = 0$

It's the "=0" that lets you say "x=" later!

$x^2 - 24x + 144 - 144 - 9 = 0$

$(x^2 - 12)^2 - 144 - 9 = 0$

$\boxed{(x-12)^2 - 153}$ keep going, almost done!

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

$x = 12 \pm \sqrt{153}$ -1

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

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

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

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

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

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

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

$x + \frac{1}{5} = \pm\frac{\sqrt{14}}{\sqrt{25}}i$ ← where does this "i" go?

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

Bring the "i" out front, it doesn't go under the radical. b/c $i = \sqrt{-1}$

-1

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Continuing #9:

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

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

-1

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

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

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

$4(x-2)^2 = 5$

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

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

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

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

Style Note
While this is numerically correct, it's a lot to read/write! You can leave the "±" together as one sol'n, too!
ie: $x = 2 \pm \frac{\sqrt{5}}{2}$
↑ constant part first
↑ ± part second

-1