1 *Solve the equation*

$$\frac{2x}{3} - \frac{x}{2} = \frac{5}{12}.$$

(Show at least one intermediate step.)

To begin with, I multiply both sides by 12 (a common denominator); after that, it's pretty straightforward.

$$\begin{aligned} \frac{2x}{3} - \frac{x}{2} &= \frac{5}{12}; \\ 8x - 6x &= 5; \\ 2x &= 5; \\ x &= \frac{5}{2}. \end{aligned}$$

If you want the solution set, that's $\{5/2\}$.

2 *Solve the inequality*

$$-3 \leq \frac{3x-4}{2} \leq 6$$

in the real number system. (Show at least two intermediate steps.)

To begin with, I multiply *all three sides* by 2, then add 4, then finally divide by 3. Since 2 and 3 (the numbers that I'm multiplying and dividing by) are positive, I keep the inequalities in the same direction.

$$\begin{aligned} -3 \leq \frac{3x-4}{2} &\leq 6; \\ -6 \leq 3x - 4 &\leq 12; \\ -2 \leq 3x &\leq 16; \\ -\frac{2}{3} \leq x &\leq \frac{16}{3}. \end{aligned}$$

If you want the solution set in interval notation, that's $[-2/3, 16/3]$.

3 *Solve the equation*

$$4x^2 - 4x + 5 = 0$$

in the complex number system. (Show at least two intermediate steps.)

I'll use the quadratic formula, with $a = 4$, $b = -4$, and $c = 5$. Then

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(4)(5)}}{2(4)} = \frac{4 \pm \sqrt{-64}}{8} = \frac{4 \pm 8\mathrm{i}}{8} = \frac{1}{2} \pm \mathrm{i}.$$

If you want the solution set, that's $\{1/2 + \mathrm{i}, 1/2 - \mathrm{i}\}$.