Today- Finish CC6

Solving Equations with rational expressions.

Book emphasizes clearing fractions

I emphasize the BASIC adding fractions techniques.

- Factor into primes
- Write in lowest terms
- Find LCD
- Write everything over the LCD

Clearing fractions is quicker. But it's not going to work for inequalities that you face in MAT 121.

§6.5 Solve the Equation See Example 4

Compare & contrast my tech. with theirs.

$2x-1=0$

$2x=1$

$x=\frac{1}{2}$

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

$D=\{x \mid x\neq 0 \text{ AND } 2x-1\neq 0\}$

$\frac{1}{x}$ $\frac{1}{2x-1}$

$=\{x \mid x\neq 0 \text{ and } x\neq \frac{1}{2}\}$

LCD $= x(2x-1)$

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

$$\frac{2x^2+2x-1}{\text{LCD}}=\frac{x}{\text{LCD}}$$

$2x^2+2x-1=x$

$2x^2+x-1=0$

$(2x-1)(x+1)=0$

$2x-1=0$ OR $x+1=0$

$x=\frac{1}{2}$ OR $x=-1$ Final Answer

$\frac{1}{2}\notin D$

$\frac{x}{5}=\frac{3}{5}\Rightarrow x=3$

$\frac{A}{B}=\frac{C}{B}\Rightarrow A=C$

check: $x=-1$:

$$\frac{2(-1)}{2(-1)-1}+\frac{1}{-1}=\frac{1}{2(-1)-1}\ ?$$

$-\frac{2}{-3}-1=\frac{1}{-3}$?

$\frac{2}{3}-1=-\frac{1}{3}$ Happens.

We say that $x=\frac{1}{2}$ is an extraneous solution.

Our algebra techniques are like casting a net. We want to catch fish, but sometimes we have to throw one back.

$$\frac{2x}{2x-1} + \frac{1}{x} = \frac{1}{2x-1}$$

Book way:

LCD = $x(2x-1)$

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

$$2x \cdot x + 1 \cdot 2x - 1 = 1 \cdot x$$

$2x^2 + 2x - 1 = x$ etc.

Reason I do NOT like book way

$$\frac{2x}{2x-1} + \frac{1}{x} \geq \frac{1}{2x-1}$$

you'll see these in MAT 121.

You can't throw away the denominator!

Back-track to §6.3 #s 35-50 y = why?

Simplify

(50) $\dfrac{3x^{-1}+3y^{-1}}{4x^{-2}-9y^{-2}} = \dfrac{\frac{3}{x}+\frac{3}{y}}{\frac{4}{x^2}-\frac{9}{y^2}}$ LCD = xy, LCD = x^2y^2

$= \dfrac{\frac{3}{x}\cdot\frac{y}{y}+\frac{3}{y}\cdot\frac{x}{x}}{\frac{4}{x^2}\cdot\frac{y^2}{y^2}-\frac{9}{y^2}\cdot\frac{x^2}{x^2}} = \dfrac{\frac{3y+3x}{xy}}{\frac{4y^2-9x^2}{x^2y^2}}$

$= \dfrac{3y+3x}{xy}\cdot\dfrac{x^2y^2}{4y^2-9x^2} = \dfrac{3(x+y)}{xy}\cdot\dfrac{x^2y^2}{4y^2-9x^2} =$

$(2y-3x)(2y+3x)$

$= \dfrac{3(x+y)xy}{(2y-3x)(2y+3x)}$

Book way

$$\frac{\frac{3}{x}+\frac{3}{y}}{\frac{4}{x^2}-\frac{9}{y^2}}$$

LCD = xy

LCD = x^2y^2

} LCD = x^2y^2

$$\frac{\left(\frac{3}{x}\right)(x^2y^2)+\left(\frac{3}{y}\right)(x^2y^2)}{\left(\frac{4}{x^2}\right)(x^2y^2)-\left(\frac{9}{y^2}\right)(x^2y^2)} =$$

$$\frac{\left(\frac{3}{x}\right)(x^2y^2)+\left(\frac{3}{y}\right)(x^2y^2)}{\left(\frac{4}{x^2}\right)(x^2y^2)-\left(\frac{9}{y^2}\right)(x^2y^2)} = \frac{3xy^2+3x^2y}{4y^2-9x^2}$$

From Before:

$$= \frac{3xy(y+x)}{(2y-3x)(2y+3x)} = \frac{3(x+y)xy}{(2y-3x)(2y+3x)}$$

The homework sheet is somehow missing a §65 question. I'll be adding one.