Test 1 make-up practice solutions

Test 1 # 1: an equation with fractions, such as: $\frac{1}{3}x-\frac{1}{5}(x+4)=2$

First use the distributive law:

$$\frac{1}{3}x-\frac{1}{5}x-\frac{4}{5}=2$$

Then eliminate the fractions:

$$\frac{3\cdot 5}{1}\cdot\left(\frac{1}{3}x-\frac{1}{5}x-\frac{4}{5}\right)=\frac{3\cdot 5}{1}\cdot 2$$

$$\frac{\cancel{3}\cdot 5}{1}\cdot\frac{1}{\cancel{3}}x-\frac{3\cdot\cancel{5}}{1}\cdot\frac{1}{\cancel{5}}x-\frac{3\cdot\cancel{5}}{1}\cdot\frac{4}{\cancel{5}}=\frac{3\cdot 5}{1}\cdot 2$$

$$5x-3x-12=30$$

Then solve for x:

$$2x=30+12$$

$$2x=42$$

$$x=21$$

Test 1 # 3: an equation with rational expressions $\frac{x+3}{x^2-3x}+\frac{x-4}{x^2+3x}=\frac{2x+5}{x^2-9}$

First factor the denominators:

$$\frac{x+3}{x(x-3)}+\frac{x-4}{x(x+3)}=\frac{2x+5}{(x+3)(x-3)}$$

Then eliminate the denominators:

$$\frac{x(x-3)(x+3)}{1}\cdot\left(\frac{x+3}{x(x-3)}+\frac{x-4}{x(x+3)}\right)=\frac{x(x-3)(x+3)}{1}\cdot\frac{2x+5}{(x+3)(x-3)}$$

$$\frac{\cancel{x}\,\cancel{(x-3)}\,(x+3)}{1}\cdot\frac{x+3}{\cancel{x}\,\cancel{(x-3)}}+\frac{\cancel{x}\,(x-3)\,\cancel{(x+3)}}{1}\cdot\frac{x-4}{\cancel{x}\,\cancel{(x+3)}}=\frac{x\,\cancel{(x-3)}\,\cancel{(x+3)}}{1}\cdot\frac{2x+5}{\cancel{(x+3)}\,\cancel{(x-3)}}$$

$$(x+3)(x+3)+(x-3)(x-4)=x(2x+5)$$

(Don't forget parentheses on the numerators!)

Distribute to multiply out and combine like terms:

$$x^2+6x+9+x^2-7x+12=2x^2+5x$$

$$2x^2-x+21=2x^2+5x$$

This will be either a linear equation (x) or a quadratic equation (x^2). Solve for x:

$$-x+21=5x$$

$$21=6x$$

$$x=\frac{21}{6}=\frac{7}{2}$$

Test 1 # 7: an equation that can be solved using the quadratic formula, and for which you should leave the answer in simplified square root form: $x^2 - 4x + 22 = 0$

Identify a, b, and c and plug into the quadratic formula:

a=1, b=-4, c=22:

$$x = \frac{+4 \pm \sqrt{(-4)^2 - 4 \cdot 1 \cdot 22}}{2 \cdot 1}$$

First simplify inside the square root:

$$x = \frac{4 \pm \sqrt{16 - 88}}{2} = \frac{4 \pm \sqrt{-72}}{2}$$

Then look for perfect square factors of the number in the square root, and simplify the square root:

$$x = \frac{4 \pm \sqrt{-1 \cdot 9 \cdot 4 \cdot 2}}{2} = \frac{4 \pm i \cdot 3 \cdot 2\sqrt{2}}{2} = \frac{4 \pm 6i\sqrt{2}}{2}$$

Factor out constants from the numerator (if possible), and cancel with the denominator (if possible)

$$x = \frac{\cancel{2}(2 \pm 3i\sqrt{2})}{\cancel{2}} = 2 \pm 3i\sqrt{2}$$

Test 1 # # 13/17 (last problem): Solve a rational equation with decimals where the answer should be given as a decimal approximation: $\frac{x^2}{(0.75 - x)(.60 - x)} = 0.10$

First simplify to get rid of the denominators:

$$\frac{\cancel{(0.75 - x)(.60 - x)}}{1} \cdot \frac{x^2}{\cancel{(0.75 - x)(.60 - x)}} = 0.10 \cdot \frac{(0.75 - x)(.60 - x)}{1}$$

$$x^2 = 0.10(0.75 - x)(.60 - x)$$

Then multiply out: group 2 and do the multiplication with them, and then multiply by the third factor:

$$x^2 = 0.10\big((0.75 - x)(.60 - x)\big)$$

$$x^2 = 0.10 \cdot (.75 \cdot .60 - .75x - .60x + x^2)$$

$$x^2 = 0.10 \cdot (0.45 - 1.35x + x^2)$$

$$x^2 = 0.10 \cdot 0.45 - 0.10 \cdot 1.35x + 0.10 \cdot x^2$$

$$x^2 = 0.045 - 0.135x + 0.10x^2$$

Get all of the terms on the same side of the "=" sign:

$$x^2 - 0.10x^2 + 0.135x - 0.045 = 0$$

$$0.90x^2 + 0.135x - 0.045$$

Note: write this line down to get the most getting partial credit if your answer is wrong.

Plug in to the quadratic formula:

$$x = \frac{-0.135 \pm \sqrt{0.135^2 - 4 \cdot 0.90 \cdot (-0.045)}}{2(0.90)}$$

Plug (carefully) into your calculator to get:

x=.160849…, -.310849…. and round to 2 significant figures (because the problem is given in decimals to 2 significant figures). You can discard the negative answer because this comes from a problem where only positive answers are allowed: x=0.16