Math 5e, Fall 2024 Homework 18

due February 12

Instructions: Some of the problems we solved in class, and some are new. Please try to solve all problems, do your best, and show your work. Write on separate sheets of paper, not between the lines of this handout!

Solving rational equations

We reviewed solving equations and solving rational equations by multiplying both sides of the equation with the denominator, for example.

$$\frac{(x+1)}{3} = 7$$
$$\frac{(x+1)}{3} \times 3 = 7 \times 3$$
$$(x+1) = 21$$
$$x = 20$$

Formulas for fast multiplication

We also revised the ***identities***: $(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a+b)(a-b) = a^2 - b^2$

And ***factorizing***:

$$a(b+c) = ab + ac$$

… and used them to solve equations.

Equations with exponents:

We solve equations where the unknown was the exponent in the power $a^x = a^c$ and found out that if we have equal bases, we need only compare the exponents (powers) to find the unknown: $x = c$.

So, we need to find a way to rewrite the equations where both sides have the same base.

Homework problems

1. Solve the following equations for *x*:
   a) $\frac{5y-12}{3-2y} = 2$ Hint: multiply both sides by $(3-2y)$. $Remember\ that\ (3-2y) \neq 0$!

   b) $\frac{8-2x}{3x-1} = 3$

   c) $\frac{3x+a}{2a-5x} = -1$

2. Solve the equation:

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

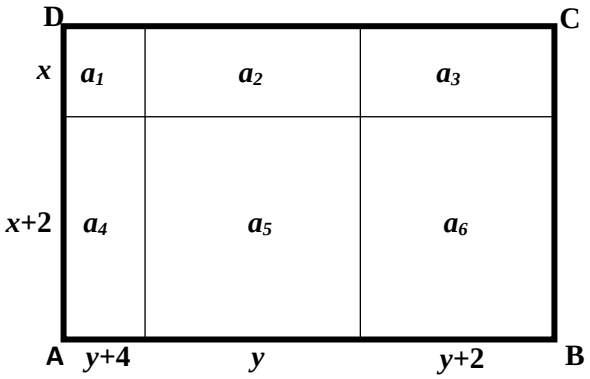
3. Simplify the fractions using the above identities and factoring rules:

   (a) $\frac{y^2-16}{3y+12} =$

   (b) $\frac{a^2+10a+25}{a^2-25} =$

   (c) $\frac{15z^2-9z}{25z^2-9} =$

4. ABCD, below, is a rectangle that is split into 6 smaller ones by 3 parallel lines. Find:
   (a) The area of each rectangle
   (b) The sum of the areas of the 6 rectangles
   (c) The total area ABCD
   (d) Compare (b) and (c)



5. Find *n* for
   (a) $3^{-n} = 3$
   (b) $3^{-n} = {}^{1}/_{3}$
   (c) $9^{-n} = 81$

6. Practice the attached Math Kangaroo paper (Do not submit!)