SchoolNova, Math 5b
Algebra Review
May 5, 2018

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a $*$. If unable to solve a problem, please present your thoughts and any partial solution.

1. Compute the following expressions:

   (a) $\frac{4}{5} \div \frac{3}{10}$

   (b) $\frac{3/4}{2/3}$

   (c) $(2 \div 3) \div 5$

   (d) $1 \div (2 + \frac{1}{3})$

   (e) $\frac{2}{2+\frac{1}{2+3}}$

2. Simplify the following expressions:

   (a)
   $$\frac{1}{x+1} - \frac{1}{x-1}$$

   (b)
   $$\left(1 + \frac{1}{x}\right) \div (x+1)$$

   (c)
   $$\left(1 + \frac{1}{x}\right) \div \left(1 - \frac{1}{x}\right)$$

3. Solve the following equations for x, and check your solution:

   (a) $\frac{x}{2} + 1 = \frac{4}{7}x$

   (b) $\frac{2}{3}x - \frac{1}{4} = \frac{1}{3}x + \frac{1}{2}$

   (c) $\frac{x}{2} - \frac{x}{3} = 8$

   (d) $\frac{x+1}{x+3} = 9$

   (e) $\frac{x-1}{3} - \frac{x-2}{4} = 1$

4. Simplify each of the following algebraic expressions, by opening the parenthesis and collecting like terms:

   (a) $a(a+b)+b(a+b)$

   (b) $(a+b)(a+b)$

   (c) $a(a+b)-b(a+b)$

   (d) $(a-b)(a+b)$

   (e) $(a+b)^2$

   (f) $(a+b)^3$

   (g) $(a+b+c)^2$

5. Solve the following equations containing absolute values, and plot on a number line:

   (a) $|x| = 7$.
   (b) $|x-3| = 7$.
   (c) $|2x-3|-4 = 3$.
   (d) $|4x+3| = 3-x$.
   (e) $|2x-12| = 4x$.

6. Solve and or plot the following inequalities on a number line:

   (a) $x > -1$ and $x < 2$.
   (b) $x \leq -4$ or $x \geq 4$.
   (c) $x^2 \leq 16$.
   (d) $|x-5| \leq 3$.

7. Solve the following equations in **two variables** x and y, and check your solutions:

   (a) $x+y = 18$ and $x-y = 2$.

   (b) $y = 2x+4$ and $y = 3x+2$.

   (c) $2x-2y = 8$ and $2x+2y = 2$.

8. In the following problems, **write an algebraic equation** and then solve it.

   (a) Half a number plus 5 is 11. What is the number?
   (b) The sum of two numbers is 16. The difference is 4. What are the two numbers?
   (c) Right now Jane is 5 and her father is 42. In how many years will he be twice as old as her? (Write the number of years as x and write an equation for x).
   (d) A boy had a bag of apples. He gave 1/2 of them to his parents, 1/5 to his brother, 1/4 to his sister and the last he ate himself. How many apples did he originally have?