San José State University
Fall 2015
Math-8: College Algebra
Section 03: MW noon–1:15pm
Section 05: MW 4:30–5:45pm

Quiz #2 (take-home)

Instructions:

Print out this quiz, do it, and turn it in on Wednesday, Sept 9 at the start of class. The quiz is open book and open notes with no time limit (other than the due date), but do not use a calculator and do not work or discuss the quiz with anyone else.

Good luck!

In problems 1–4, fill in the blanks.

1. An algebraic expression is a sum of **terms**.

Many of you tried to use the first definition in the first box of section 0.2 in the book. But if you look right under the box, you will see the correct answer, and the answer is actually given in the next question!

2. An algebraic term is a product of constants (called **coefficients**) and **variables**.

Most of you got the variable part right, but many of you answered "real number" for the constant part. But both the coefficients and the variables are real numbers (remember - it's just a number). Plus, the answer is actually given in question 5!

3. An algebraic equation is two algebraic **expressions** separated by **an equals sign**.

Most of you got this right. Some answered "terms" separated by "plus sign", which is the definition for an expression (see problem 1), not an equation.

4. We **evaluate** an algebraic expression, but we **solve** an algebraic equation.

Most of you got this one correct also; however, some of you answered "simplify" instead of evaluate. We simplify both expressions and equations, depending on the problem, but we specifically evaluate expressions when we plug in a value. For equations, we solve to find that value.

5. Identify the parts of the term $-\frac{2xy^2z}{13}$:

Coefficient: $-\frac{2}{13}$

I asked for the "coefficient", singular, which means that there is only one answer, and that answer has to include all the constant values and most definitely any minus sign.

Variables: $\underline{x, y, z}$

Many of you included the exponent on the y. This is not correct. The exponent may be part of a "variable term", but the variable itself is just y.

6. True or false: There exists $x, y \in \mathbb{R}$ such that $x, y \neq 0$ and $xy = 0$.

FALSE! The question is asking if we can multiply two non-zero numbers and get zero. No! This is a very special property of the real numbers. See the properties of zero on page 14, property number 5.

7. Evaluate $5(3 - (x - 3))$ at $x = 1$.

$5(3 - ((1) - 3)) = 5(3 - (-2)) = 5(3 + (-1)(-2)) = 5(3 + 2) = 5(5) = 25$

A couple of you wrote that $3 - (-2) = 6$. But the problem is addition, not multiplication.

8. A careful solution of $5x - 3 = 12$ is given below. Give the rationale for each step from the ten real number rules (A1–A4, M1–M4, LD, RD) and two additional rules (SUB, CAN) that we discussed in lecture. Note that some steps have two things to identify.

$5x - 3 = 12$	
$(5x - 3) + 3 = 12 + 3$	**CAN**
$(5x - 3) + 3 = 15$	**SUB**
$5x + (-3 + 3) = 15$	**A2**
$5x + 0 = 15$	**A4**, **SUB**
$5x = 15$	**A3**, **SUB**
$\frac{1}{5}(5x) = \frac{1}{5}(15)$	**CAN**
$\frac{1}{5}(5x) = 3$	**SUB**
$(\frac{1}{5}5)x = 3$	**M2**
$1x = 3$	**M4**, **SUB**
$x = 3$	**M3**, **SUB**

A couple of you came close on this, but for the most part, the class just didn't get this. The idea is to take a step, look at the next step, determine what changed, and then to match that to one of our rules.

When we "do the same to both sides", that is cancellation ($a + c = b + c$ iff $a = b$ and $ac = bc$ iff $a = b$. When we simplify an expression (on route to a solution) we are using substitution. In fact, on the lines that have two answers, substitution is just about always the second answer.

Make sure that you understand how to do this. There will be a similar question on the end-of-Sept exam.

9. Solve: $\frac{3(x-5)}{4(x+1)} = \frac{9}{2}$

The correct way to do this is to cross multiply. For an example, see problem 40 from the homework. Here is a very careful solution. Please note that the numbers never need get big and decimals should not be used. I know that many of you dislike it when I show all the steps, but if you understood the underlying steps, the solutions should be much simpler than what most of you showed.

And, BTW - NO MORE DECIMALS, PLEASE! Keep everything in fractions unless instructed otherwise, or the problem has decimal inputs.

$$
\begin{aligned}
\frac{3(x-5)}{4(x+1)} &= \frac{9}{2} \\
2(3(x-5)) &= 9(4(x+1)) \quad \textbf{(cross-multiply)} \\
(2\cdot 3)(x-5) &= (9\cdot 4)(x+1) \quad \textbf{(M2)} \\
6(x-5) &= 36(x+1) \quad \textbf{(SUB)} \\
\frac{1}{6}(6(x-5)) &= \frac{1}{6}(36(x+1)) \quad \textbf{(CAN - Do first to keep numbers small!)} \\
(\frac{1}{6}6)(x-5) &= (\frac{1}{6}36)(x+1) \quad \textbf{(M2)} \\
(1)(x-5) &= (6)(x+1) \quad \textbf{(M4,SUB)} \\
x-5 &= 6(x+1) \quad \textbf{(M3,SUB)} \\
x-5 &= 6x+6 \quad \textbf{(LD)} \\
-x+(x-5) &= -x+(6x+6) \quad \textbf{(CAN)} \\
(-x+x)-5 &= (-x+6x)+6 \quad \textbf{(A2)} \\
0-5 &= (-1+6)x+6 \quad \textbf{(A4,SUB,LD)} \\
-5 &= 5x+6 \quad \textbf{(A3,SUB)} \\
-5+(-6) &= (5x+6)+(-6) \quad \textbf{(CAN)} \\
-11 &= 5x+(6+(-6)) \quad \textbf{(SUB,A2)} \\
-11 &= 5x+0 \quad \textbf{(A4,SUB)} \\
-11 &= 5x \quad \textbf{(A3,SUB)} \\
\frac{1}{5}(-11) &= \frac{1}{5}(5x) \quad \textbf{(CAN)} \\
\frac{-11}{5} &= (\frac{1}{5}5)x \quad \textbf{(M2)} \\
\frac{-11}{5} &= (1)x \quad \textbf{(M4,SUB)} \\
\frac{-11}{5} &= x \quad \textbf{(M3,SUB)} \\
x &= -\frac{11}{5}
\end{aligned}
$$

10. Evaluate the left-hand-side expression in (9) at your answer in order to prove that you have found a correct solution.

Notice that in the solution below, the numbers never get real big. Normally, do what is inside parenthesis first, don't distribute when evaluating.

$$\begin{aligned}
\frac{3\left(\left(-\frac{11}{5}\right)-5\right)}{4\left(\left(-\frac{11}{5}\right)+1\right)} &= \\
\frac{3\left(\left(-\frac{11}{5}\right)+\left(-\frac{25}{5}\right)\right)}{4\left(\left(-\frac{11}{5}\right)+\left(\frac{5}{5}\right)\right)} &= \\
\frac{3\left(-\frac{36}{5}\right)}{4\left(-\frac{6}{5}\right)} &= \\
\frac{3}{4}\left(\frac{36}{5}\right)\left(\frac{5}{6}\right) &= \\
\frac{3}{4}(6) &= \\
\frac{9}{2}
\end{aligned}$$