**Math 101, Littlefield**
**Key and Discussion for Homework "Arithmetic in Visual Notation and Single-Line Notation"**
**More Homework Due Next Class Cession**

I had two goals in correcting this homework: 1) check that you personally did the correct computation, and 2) check to be sure that everything you wrote down correctly described the computation you did.

What generally happens on this assignment is that people do the computations correctly, but almost everybody writes down some incorrect expressions that describe a different calculation!

The most common mistakes are:

1. This is the biggie: **missing parentheses** around an expression that had been above or below a division bar. This is a serious problem that changes the order of operations and almost always gives the wrong result. These are marked in red on your papers as "Need these!"

2. Not properly ordering sequences of multiplication and/or division using the left-to-right rule. 2*3*4/5/6*7 should be interpreted as (((((2*3)*4)/5)/6)*7). Putting the parentheses in other places changes the order of operations and often (not always) gives the wrong result.

3. Replacing fractions with their decimal equivalents. This often results in getting an answer that is only approximately correct, rather than exact. Sometimes that's acceptable, sometimes it's not.

4. Having unbalanced parentheses. An example (not from this homework) would be "(2+6))". This is a syntax error that would be reported by any computer, so it's a clear-cut error but also pretty harmless.

5. Not converting some division bars into slashes. A lot of short bars got left as horizontal bars with numbers above and below them. This is not too worrisome because it does not change the order of operations of the expression. But it's not single-line notation — you can't type it into a spreadsheet.

6. Putting extra parentheses around just numbers, for example **(45)**. This is harmless except for adding some unnecessary clutter.

There were a few other miscellaneous mistakes, which I have marked individually on each paper.

**New Homework Due Next Class Session**

Rework any problems that I marked wrong, and hand them in for me to check again.

Since the correct answers are given on the next page, you need to treat this as an exercise in "reproduce from understanding". Look at the correct answer, figure out why the correct answer <u>is</u> the correct answer, then set it aside and work the same problem for yourself without the correct answer in front of you. After you're done, check all your answers. If you got any of them wrong, then do it again. ("Lather, rinse, repeat.") Keep working these problems until you can work <u>all</u> of them correctly without having to think very hard about them. You need to have this stuff completely solid or you're going to have lots of trouble later.

**Correct Answers:**

1. $\frac{50-4*2}{6+1}$ = **(50-4*2)/(6+1) = ((50-(4*2))/(6+1)) = 6**

2. $\frac{45}{3*5}$ = **45/(3*5) = (45/(3*5)) = 3**

3. $\frac{1}{2}\cdot 49\cdot(11+13)$ = **1/2*49*(11+13) = (((1/2)*49)*(11+13)) = 588**

4. $\frac{1}{3}\cdot 10\cdot 20\cdot 30$ = **1/3*10*20*30 = ((((1/3)*10)*20)*30) = 2000**

5. $\frac{2\cdot(10+5)}{7+8}$ = **2*(10+5)/(7+8) = ((2*(10+5))/(7+8)) = 2**

6. $100/5/2*4$ = **100/5/2*4 = (((100/5)/2)*4) = 40**

7. $\frac{4\cdot 21+7}{14-7}$ = **(4*21+7)/(14-7) = (((4*21)+7)/(14-7)) = 13**

8. $\frac{4\cdot 21+7\cdot 13+7}{13}$ = **(4*21+7*13+7)/13 = ((((4*21)+(7*13))+7)/13) = 14**

9. $\frac{-2\cdot 4+4}{4}$ = **(-2*4+4)/4 = (((-(2*4))+4)/4) = -1**

10. $\frac{1}{\frac{1}{3}+\frac{1}{6}}$ = **1/(1/3+1/6) = (1/((1/3)+(1/6))) = 2**

PS: On the theme of **"Mistakes Happen...The Most Important Thing Is To Find Them and Fix Them Before They Cause A Problem"**...

After typing draft versions of the "correct answers" shown above, I copy/pasted them into Excel to make sure that each expression was at least syntactically correct and produced the correct value. Four of them had unbalanced parentheses. I found two more mistakes later, where I had not put in quite enough parentheses to completely specify the order of operations. Cross-check everything!