Style Suggestions for WeBWorK Answers

WeBWorK takes answers written in text (as opposed to graphics, like you may have seen with programs like WebAssign). This has its own share of pluses and minuses.

The big benefit: You can copy and paste! This allows you to

- reuse work from different parts of a problem
- do your work in a separate file and then just copy the answer over
- transfer your work more easily in email, for instance

However, this comes with a price: it's hard to look at the answers!

- **Parentheses** will show up a whole lot.
- The answer can get pretty long horizontally, making it tough to pick apart individual pieces.

I have a few main suggestions that will make it easier for you to enter answers and for me to help read your answers if you have questions.

Dr. Klipper's WeBWorK suggestions

1. **The Preview Answer button is your friend!**

   There's a button, next to Submit Answer, that lets you view a preview of how your answer looks. This can be a great tool for catching if you got the correct numerators and denominators of fractions, for instance. It's also a good way of catching when you don't have enough parentheses.

   For example,
   $$\texttt{e\^{}3x} \text{ produces } e^3x$$
   because WeBWorK doesn't know the 3 and x should belong together in the exponent. Instead, you want
   $$\texttt{e\^{}(3x)} \text{ to make } e^{3x}$$

2. **Use spaces in sums and differences.**

   Almost all the time, WeBWorK doesn't care how much space you put between things. I find it much more readable if you put spaces around every $+$ and $-$ that you write. (For products $*$ or quotients $/$, I don't find it matters as much.) This will help you notice your order of operations.

   For instance, the left expression is much harder to read than the right one:

   $$\texttt{(2x+1)(3x\^{}2+4x-sin(x))} \qquad \texttt{(2x + 1)(3x\^{}2 + 4x - sin(x))}$$

3. **Mix up your grouping symbols.**

WeBWorK doesn't have to just use parentheses ( ). You can also use square brackets [ ] and curly braces { } for the same purpose! I recommend that you alternate between ( ) and [ ] as you go deeper into an expression.

For instance, this string

```
(sin(2x) + 3x * e^(2x)) / ((x + 1)(3x + 4))
```

produces $\dfrac{\sin(2x) + 3x \cdot e^{2x}}{(x + 1)(3x + 4)}$, but the following string is better:

```
[sin(2x) + 3x * e^(2x)] / [(x+1)(3x + 4)]
```

As another example, consider trying to pick apart the pieces of this WITHOUT using varied symbols!
```
{e^(2cos[3x + arctan x])} / {4x^2}
```

With this use of symbols, I can immediately tell that the { } parts represent the fraction, the ( ) represent the value on top of the e, and the [ ] represent the angle inside the cosine.

4. **Write your parentheses first, THEN fill them in.**

You should look at the Orientation assignment, pages 6 and 7, for more detail about this, but the main idea is that it's much easier to write your answer from the outside in than from left to right. You can first "block out" the parts you expect in the answer and then fill them in later. Not only will this keep you from accidentally mismatching parentheses, but it will keep the different parts of your answer clearer in your mind.

Basically, you fill in your answer in reverse order of operations!

For instance, if I want to make the expression

$$\frac{2x(\sin x + 3) - 2(\cos x)}{(\sin x + 3)^2}$$

I would first note that I have a fraction, so I'd immediately block out grouping symbols for its top and bottom:
```
[ ] / [ ]
```

Next, I know the numerator has a difference, so I'd write its minus first. I'll also go put in the square in the denominator:

```
[( ) - ( )] / [( )^2]
```

(Notice how I'm alternating my grouping symbols?) Lastly, I'll fill in the remaining pieces:
```
[2x(sin x + 3) - 2(cos x)] / [(sin x + 3)^2]
```

If you think this produces too many parentheses, you can always remove them at the end. I recommend you do one step at a time with answer preview for this!

5. **Use unsimplified numbers instead of rounding.**

   WeBWorK has some odd rules about how many decimal places it wants in the answer. In general, though, you shouldn't be rounding anyway. There are two problems with a rounded answer:

   - If the answer is wrong, you have to redo the work all over to get a new answer.
   - When you study your HW later, you can't tell at a glance where the answer came from! (You want your work to illustrate the process as much as the answer.)

   Thus, I'd much prefer to see `sqrt(2)` in the answer instead of `1.4142`. If these numbers get too long, use Strategy 4 above and block out room for that number first! For instance, to type $\sqrt{234} - \cos(22\pi/180)$, you can always type

   [ ] - [ ] and then fill in as `[sqrt(234)] - [cos(22pi/180)]`

   (Afterwards, you'd see the [ ] are redundant.)

   Revisit this list every so often if you're getting bogged down with complicated answers. People get sloppy over time if they don't practice good habits. You may develop some different habits of your own too!