RECITATION: WEEK 3

Note that every simplification technique is explicitly tied to one or more homework problems due this week.

1. (difference of squares rule) How to factor $a^2 - b^2 =$

   (a) Explain how you know that $a^2 + b^2$ *cannot* be factored in a similar way.

   (b) Factor $x^2 - 11$

   (c) (2.3 # 97) Assuming t is positive, use the rule above to factor $t - 16$.

   (d) Multiply out the expression below and explain what it has to do with the rule above:

   $(\sqrt{x+1} + 7)(\sqrt{x+1} - 7) =$

   (e) (2.3 # 102) Simplify the expression below by *rationalizing the numerator*. This means multiplying numerator and denominator (why both?) by something that will get rid of the square root in the numerator.

   $$\frac{\sqrt{x-2}+3}{x-11}$$

2. Cancelling

   (a) Given a fraction, how do you know when you can cancel something from the numerator and denominator?

   (b) For each of the following, decide if there is a term you can cancel.

      i. $\frac{x^3-xy}{zx+2x}$

      ii. $\frac{x^3-xy}{zx+x+1}$

      iii. $\frac{a^2+ab}{ab+b^2}$

      iv. $\frac{h}{a^2+h^2}$

      v. $\frac{-a-b}{a^2-b^2}$

3. How to simplify $\dfrac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} =$

   (a) Choose integer numerical values for a, b, c and d to demonstrate that the rule above is correct.

   (b) Find numerical values for a, b, c and d that demonstrate that to following approach is WRONG:

   (WRONG $\longrightarrow$) $\dfrac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)} = \dfrac{ac}{bd}$

(c) Use the rule above to simplify

$$\frac{\left(\frac{a}{b}\right)}{(c)} = \qquad \text{and} \quad \frac{(a)}{\left(\frac{c}{d}\right)} =$$

(hint: Use the fact that $r = \frac{r}{1}$.)

(d) (2.3 # 98) Simplify $\frac{\left(\frac{c}{c+d}\right)}{d}$

(e) (2.3 # 99) Simplify $\frac{\cos\theta}{\cot\theta}$

4. How to add $\frac{a}{b} + \frac{c}{d} =$

(a) (2.3 #98) Write as a single fraction. Simplify.

$$\frac{1}{c+d} - \frac{1}{c}$$

(b) (2.3 #98) Simplify $\dfrac{\frac{1}{2c+d} - \frac{1}{2c}}{d}$