CSE 311: LaTeX Workshop; practice problems

Question 1: Celebration?

This year is the 311st anniversary of CSE 311. We have decided to buy a cake for the celebration. Nicole ate a **quarter** of the slices, Jefferson ate **half** of them, and Andrew crashed the party and stole a **sixth** of the total slices. After these three TAs took their slices, there were only **three** slices left for the other TAs.

How many slices was the cake originally divided into? Be sure to show your work.

Question 2: Propositional Logic

(a) Consider the following sentence:

"If I know LaTeX, then I can write fancy papers or homework assignments."

Define propositional variables for each atomic clause and translate the sentence into logical notation.

(b) Write out a truth table for your proposition from part (a).

(c) Draw your propositional statement from part (a) as a circuit. You should use the Law of Implication to convert all implications into disjunctions first.

LaTeX hint! Since typesetting circuits can be difficult, try a different program to draw the circuit visually! (You can find free websites online that let you do this, use MS paint, etc). Once you're done, save the circuit as an image, and embed the image within your document.

Alternatively, if you want a challenge and use LaTeX for everything, try using the Circuitikz package.

(d) Write a Java method that accepts true/false values for p, q, and r as parameters, and returns the result of evaluating the proposition from part (a).

(e) **Challenge question:** Prove that your proposition is equivalent to $\neg q \rightarrow (p \rightarrow r)$ using the rules from today's lecture handout (e.g. associativity, commutivity, absorption, domination, law of implication, etc).

If you're not sure how to do this, we'll be covering this on Friday and Monday!

Question 3: Simplification

Simplify the equation $6(3p - 2) - (5p + 1)(2p + 2)$. Take small steps, and briefly justify each step you take.

Question 4: Sneak Peek

If n is a positive integer (that is, if $n \in \mathbb{N}$), explain why dividing $n(n + 1)(n + 2)$ by 6 will always produce a positive integer. You should attempt to explain why in English as rigorously as you can.

Question 5: Ymmy

In honor of its new location, Dozen's Cupcakes is holding a party, where the owners will give out lots of free cupcakes! A day before the party, they notice that an employee was eating some of their cupcakes and fired him on the spot.

As revenge for being fired, the former employee tainted one of the 30 batches of cupcakes for the party with an undetectable poison. Eating even a piece of the tainted cupcake would kill any living being in precisely 23 hours. Several days ago, the owners caught five mice trying to get into their kitchen, and they are willing to feed pieces of a single cupcake from each batch to the mice to hopefully find the tainted one.

Is it possible for them to find the tainted tray in time for the part in 24 hours? If so, how?