ComS 331 Spring 2024 Name: Aren Ashlock

1. Give a regular expression, simplified to the best of your abilities, for the language of **all** strings of a's, b's, and c's where a is never immediately followed by b.

   We start with the expression: $(a+b+c)^*$.
   However, we have to alter the term with 'a' in it due to the problem description.
   Therefore, we get a^*c since every a is followed either by an a or c.
   It's wrong to have a^*c^* since we encompass consecutive c's in the '$+c$' term of the original expression.
   Answer: $(a^*c+b+c)^*$

2. Give a regular expression, simplified to the best of your abilities, for the language of **all** strings of a's, b's, and c's that contain an even number of b's.

   We start with the expression: $(a+b+c)^*$.
   However, we have to alter the term with 'b' in it due to the problem description.
   Therefore, we get $b(a+c)^*b$ since every b must come in pairs with some amount (or no amount) of a's and c's in between.
   Answer: $(a+b(a+c)^*b+c)^*$

3. Simplify (if possible) the expression $(a+b)^*(a+b+c)^*(a+b)^*$, then describe as concisely as you can in English the language it defines.

   Simplified: $(a+b+c)^*$
   English: The language of all strings of a's, b's, and c's.

4. Simplify (if possible) the expression $(a+b)^*c^*(a+b)^*$, then describe as concisely as you can in English the language it defines.

   This expression **CANNOT** be simplified.
   English: The language of all strings of a's, b's, and c's where all c's are consecutive.