Group Work, Regular Expressions
CSC-161, Dr. Ostheimer

1. Find a regular expression for the set of words over $\{0, 1\}$ of length greater than two and for which the third symbol from the left is a 1.
2. Find a regular expression for the set of words over $\{0, 1\}$ which are of length greater than two and for which the third symbol from the right is a 1.
3. Find two very different regular expressions for the set of words over $\{0, 1\}$ of length 4 or less.
4. True or false: for every finite language L there is a regular expression denoting L.
5. True or false: for every infinite language L there is a regular expression denoting L. (Hint: you don't know enough to answer this very well yet. Just do your best.)
6. Find a regular expression for the set of words over $\{0, 1\}$ with an even number of 1's.
7. Characterize those languages that are denoted by regular expressions that don't contain *.
8. Find an example of a language L such that for every regular expression denoting L, a parenthesis is needed.
9. For which of the following problems do you think an algorithm exists? For some of these you don't have the tools yet to answer the question. Try to identify which questions fall in that category, and then speculate as to the answer in those cases.
   (a) Given a regular expression r, find a regular expression for the star closure of $L(r)$.
   (b) Given a regular expression r, find a regular expression for the reverse of $L(r)$.
   (c) Given regular expressions r_1 and r_2, find a regular expression for $L(r_1) \cup L(r_2)$.
   (d) Given a regular expression r, find a regular expression for the complement of $L(r)$.
   (e) Given regular expressions r_1 and r_2, find a regular expression for $L(r_1) \cap L(r_2)$.