Problem 4. First, we create a DFA to solve the problem:

Now we use state elimination (3.2.2 in Hopcroft, et al.) to get a regular expression that is equivalent to the DFA. First, eliminating state B, we get:

Next, we eliminate state D:

Finally, we eliminate state C. This leaves us only with state A, which is an accepting state. Our final expression is

A few notes:

- Some people tried using the $R_{ij}^k$ method. While this is a good formal strategy to know, the amount of work it requires is immense. Know the method, but only use it if you must.
- Some people tried eliminating state C before B or D. When you eliminate state C, you get some self loops with more complicated regular expressions. These get incorporated into the reg-exp’s when you later eliminate state B or D. In this case, eliminating states B and D before eliminating state C gives a simpler regular expression in the end. While they are not vital, think about these kind of optimizations when you use this method.