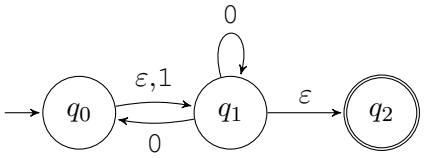
**Week 2 Tutorial Session**

Tutorial exercises include more problems than a typical student can solve in 15-20 minutes. Don't be discouraged if you cannot solve all the problems within the time limit.

1. Draw a state diagram of a DFA (over $\{\mathtt{a}, \mathtt{b}\}$) that accepts the following language:
   (a) $\{w \mid w$ contains the substring `baa`$\}$
   (b) $\{w \mid w$ has at least two `a`'s or at least two `b`'s$\}$
   (c) $\{w \mid w$ contains the same number of occurrences of `ab` and `ba` as substrings$\}$
   For example `aba` is in this language because `aba` contains a single `ab` and a single `ba`, but `abab` is not in this language because `abab` contains two `ab` and one `ba`.

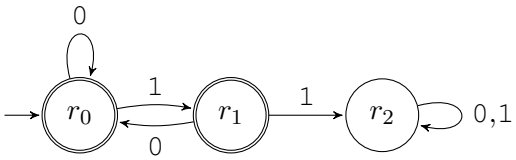
2. Prove that every NFA can be converted into an equivalent one that has a single accepting state.

3. (a) We considered the following NFA in the second lecture:




   Does the NFA accept `01`? `11`? `011`?

   (b) Consider the following DFA:




   What strings stop at $r_0$? At $r_1$? At $r_2$? What is the language of the DFA?