



1. Construct a Mealy machine equivalent to the Moore machine on page 165, exercise 3(iii).
2. Construct a Moore machine equivalent to the Mealy machine on page 166, exercise 6(iii).
3. Design an FA with output, whichever is appropriate, that will output the input string with an extra 0 at the end if it has an odd number of 1-bits, and will output the input string with an extra 1 at the end if it has an even number of 1-bits.
4. Design an FA with input alphabet $\{1\}$ and output alphabet $\{0,1\}$ that "divides by 5" in the following sense: it treats the input string as a base-1 number and outputs a string of 0's and 1's such that the total number of 1's output is equal to the input number divided by 5, with no remainder. E.g. if the input number is 1111111, then the output number should have one 1.
5. Define a collection of languages over the alphabet $\{a,b\}$ that is closed under union and intersection but not under complement. Justify why the collection has these properties. It need not be a rigorous proof, but the argument must be based on facts.