**Homework problems**

1. Build a GFSM that accepts the language of all words that begin and end with the same double letter, i.e., either of the form aa…aa or bb…bb. Note that aaa and bbb are not words in this language.

a∪b

aa aa

+

-

bb bb

a∪b

2. If L is a language that is accepted by a GFSM called G, prove that there is a GFSM that accepts the language of all strings of a's and b's that end in a word from L. Hint: construct such a GFSM.

Convert G to desirable form if it is not already. The following GFSM accepts the specified language (the ε-edge goes to the unique start state of G, whose – sign is dropped):

a∪b ε

G

-

3. Build a GFSM that accepts L(ab\*aa∪bba\*ab). Your machine cannot have more than 5 states.

b

a aa

+

-

bb ab b

+

a

4. Convert the following GFSM to RE:

+1

a b

-2

+4

a∪b ba ab

3

You must use the algorithm discussed in class and eliminate states in the following order:1, 4, 3, 2.

## All states are reachable from the start state.

## The language generated by M is not empty.

1. M is not in desirable form. We introduce a unique start state with no incoming edges and a unique final state with no outgoing edges:

ε b a∪b

2

1

+

ε a ε ab

4

ba

-

3

* eliminate 1:

b a∪b

2

+

ε a ε ab

4

ba

-

3

* eliminate 4 and combine:

a∪b a∪b

2

+

ε ab

ba

-

3

* eliminate 3 and combine:

a∪b a∪b∪abba

2

+

ε

-

* eliminate 2:

(a∪b∪abba)\*(a∪b)

+

-