

# Homework – week 2

- pp.125, Exercise 3.3.2 (a)(c), 3.3.5 (a)(e)
- pp.151-152, Exercise 3.6.3, Exercise 3.6.4

# Homework-Week 2

- Exercise 3.3.2 (a)(c) Problem:

Describe the languages denoted by the following regular expressions:

a)  $a(alb)^*a$ .

c)  $(alb)^* a(alb)(alb)$ .

- Answer:

a) String of a's and b's that start and end with a.

c) String of a's and b's that the character third from the last is a.

# Homework-Week 2

- 3.3.5 (a)(e) Problem:

Write regular definitions for the following languages:

a) All strings of lowercase letters that contain the five vowels in order.

e) All strings of digits with at most one repeated digit.

Answer:

a)want -> other\* a (other|a)\* e (other|e)\* i  
(other|i)\* o (other|o)\* u (other|u)\*

other -> [bcdfghjklmnpqrstvwxyz]

# Homework-Week 2

e) want  $\rightarrow (FE^*G|(aa)^*b)(E|FE^*G)$

$E \rightarrow b(aa)^*b$

$F \rightarrow a(aa)^*b$

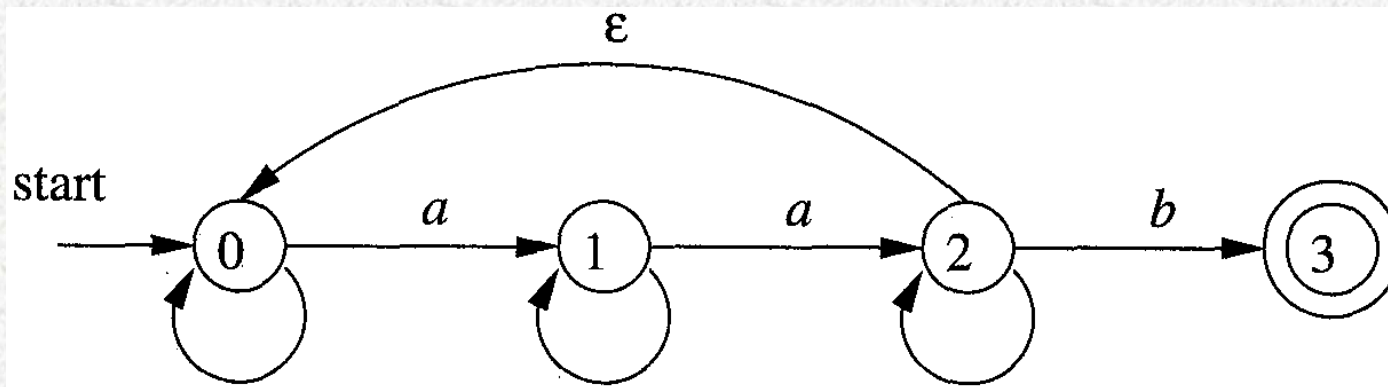
$G \rightarrow b(aa)^*ab|a$

$F \rightarrow ba(aa)^*b$

# Homework-Week 2

- Exercise 3.6.3 Problem:

For the NFA of Fig. 3.29, indicate all the paths labeled  $aabb$ . Does the NFA accept  $aabb$ ?



# Homework-Week 2

- Exercise 3.6.3
- Answer:
- (0) -a-> (1) -a-> (2) -b-> (2) -b-> ((3))
- (0) -a-> (0) -a-> (0) -b-> (0) -b-> (0)
- (0) -a-> (0) -a-> (1) -b-> (1) -b-> (1)
- (0) -a-> (1) -a-> (1) -b-> (1) -b-> (1)
- (0) -a-> (1) -a-> (2) -b-> (2) -b-> (2)
- (0) -a-> (1) -a-> (2) -b-> (2) -ε-> (0) -b-> (0)
- (0) -a-> (1) -a-> (2) -ε-> (0) -b-> (0) -b-> (0)
- This NFA accepts "aabb"

# Homework-Week 2

- Exercise 3.6.4 Problem:
- Repeat Exercise 3.6.3 for the NFA of Fig. 3.30
- Answer:
- $(0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{a} (1) \xrightarrow{b} (2) \xrightarrow{a} ((3))$
- $(0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{a} (1) \xrightarrow{b} (2) \xrightarrow{\varepsilon} (1) \xrightarrow{b} (2)$
- $(0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{\varepsilon} ((3)) \xrightarrow{\varepsilon} (2) \xrightarrow{\varepsilon} (1) \xrightarrow{b} (2) \xrightarrow{b} ((3))$
- $(0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{a} (1) \xrightarrow{\varepsilon} (0) \xrightarrow{\varepsilon} ((3)) \xrightarrow{\varepsilon} (2) \xrightarrow{b} ((3)) \xrightarrow{\varepsilon} (2) \xrightarrow{b} ((3))$