# Automata.
CW 1.3, F29LP

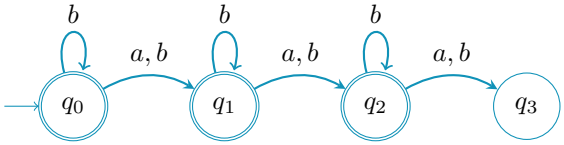
Yoav Levi
H00347035

## 1 $/(ab)*/$

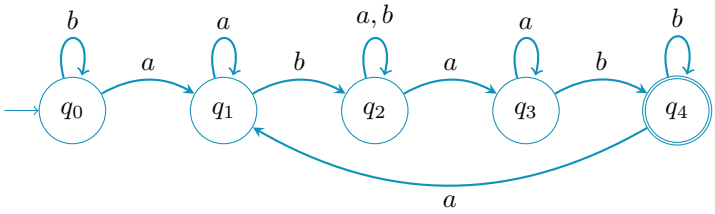
## 2 $/(b*a)+a+b[ab]*/$

## 3 NFA

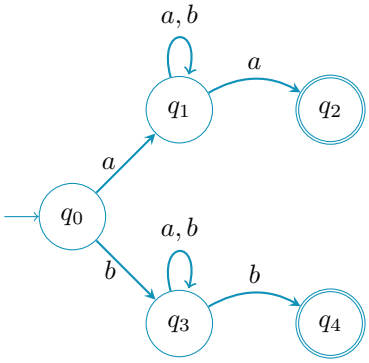
1. $L = \{w \in \{a,b\}* | \text{w contains at most two a's}\}$




2. $L = \{w \in \{a,b\}* | \text{w contains an even number of occurrences of ab as a subword}\}$




3. $L = \{w \in \{a,b\}* | \text{the first and the last letter of w are identical}\}$




## 4 $/a*(ba\{2,\})*/$

## 5

$$S \to aA$$
$$A \to aB$$
$$B \to aS|aC$$
$$C \to S|\epsilon$$

# 6 Unmarked, N/A

# 7

1.

$$S \to aA|bB$$
$$A \to aA|bS|aB|\epsilon$$
$$B \to aS$$

2. Is ambiguous as "aaaa" can be constructed in two ways

(I)

| Rule | Result |
|---|---|
| $S \to aA$ | a |
| $A \to aA$ | aa |
| $A \to aA$ | aaa |
| $A \to aA$ | aaaa |
| $A \to \epsilon$ | $\underline{aaaa}$ |

(II)

| Rule | Result |
|---|---|
| $S \to aA$ | a |
| $A \to aB$ | aa |
| $B \to aS$ | aaa |
| $S \to aA$ | aaaa |
| $A \to \epsilon$ | $\underline{aaaa}$ |

# 8 The CFG is used to create a number of a's with an equivalent number of b's, in any order.