

CPSC 42U/501

Section 1.2 [Sip] NFA's:

- NFA example (with $\delta(q, a) = \emptyset$)
- Thm: L recognized by an NFA \Rightarrow
" " " " some DFA.
- Corollary: Regular languages closed under
 $\cap, \cup, \text{complement}, \emptyset, *$

Section 1.3 [Sip] Regular Expressions:

- Def of Regular Expression: any $\cup, \emptyset, *$
of $\{\text{single letter}\}, \{\epsilon\}, \emptyset$
- Thm: L described by a regular expression
 $\Leftrightarrow L$ is regular.

Breakout Room Questions:

(1) How many states needed to

recognize $\{a^5, a^7\}^*$ by a DFA

(2) How many states needed to

recognize $\{a^5, a^7\}^*$ by an NFA

(3) If an NFA has 1000 states,

its corresponding DFA may have roughly 2^{1000}

states. Is there a relatively quick way

to see if the NFA accepts a given string?

④ Give an NFA that

recognizes

$$L = \left\{ w \in \{0,1\}^* \mid \begin{array}{l} \text{the 3rd to last symbol} \\ \text{of } w \text{ is } 1 \end{array} \right\}$$

$$= \{0,1\}^* \circ \{1\} \circ \{0,1\}^2$$

$$= \left\{ \sigma_1 \dots \sigma_k \mid \begin{array}{l} k \geq 3, \sigma_1, \dots, \sigma_k \in \{0,1\} \\ \text{with } \sigma_{k-2} = 1 \end{array} \right\}$$

⑤ Give a DFA that recognizes

L in question ④