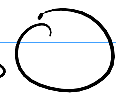
Math 322

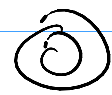
FSA from regular set → $\{\}, \{\lambda\}, \{x\}$; → $AB, A\cup B, A^*$ [assume A, B are regular]

Basis

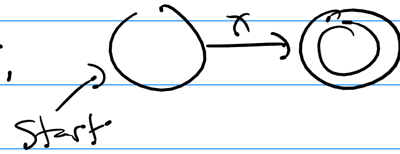
$M_{\{\}}$: start →



$M_{\{\lambda\}}$: start →

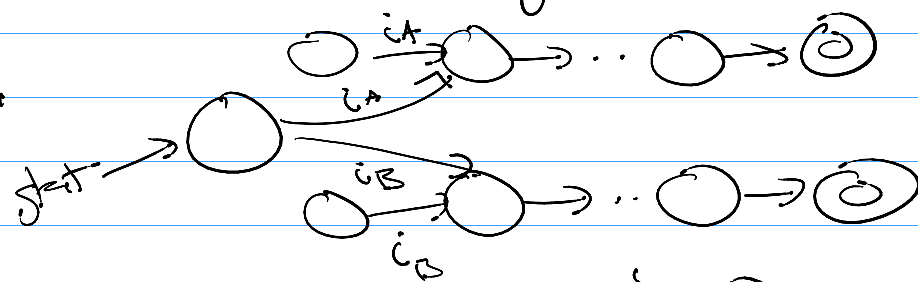


$M_{\{x\}}$:



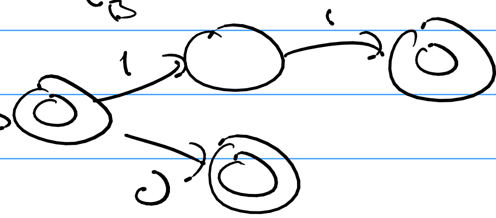
Assume M_A, M_B recognize reg. sets A, B

$M_{A\cup B}$:

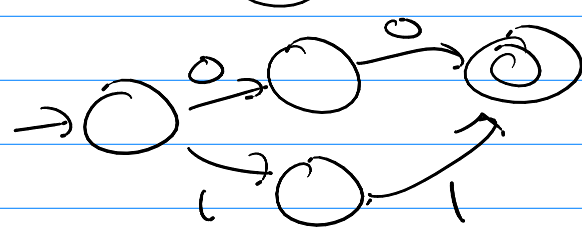


ex

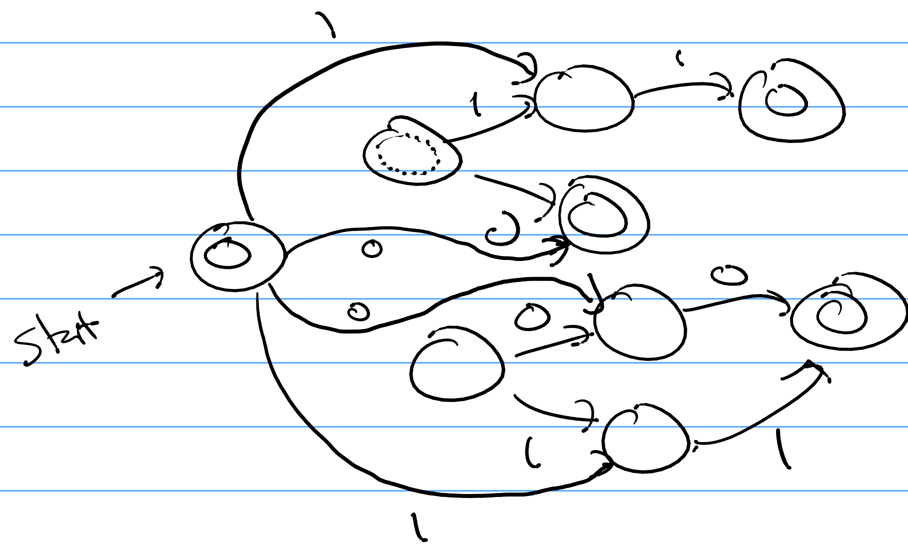
M_A : Start →



M_B : start →

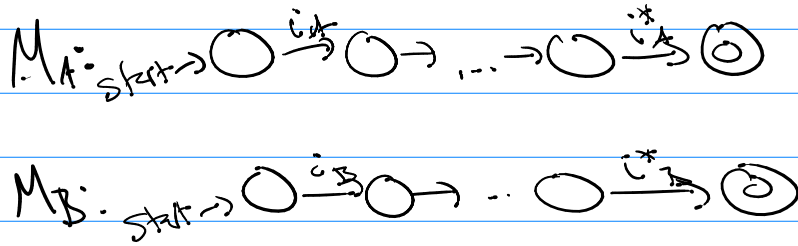


$M_{A\cup B}$

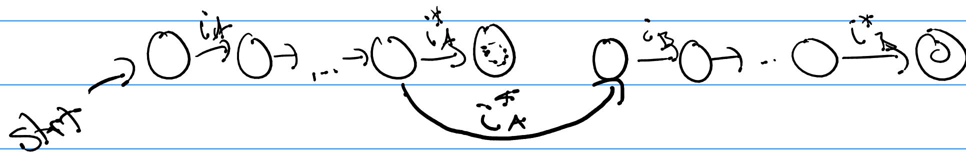


$AB = \{ab \mid a \in A \wedge b \in B\}$

M_{AB}:



M_{AB}:

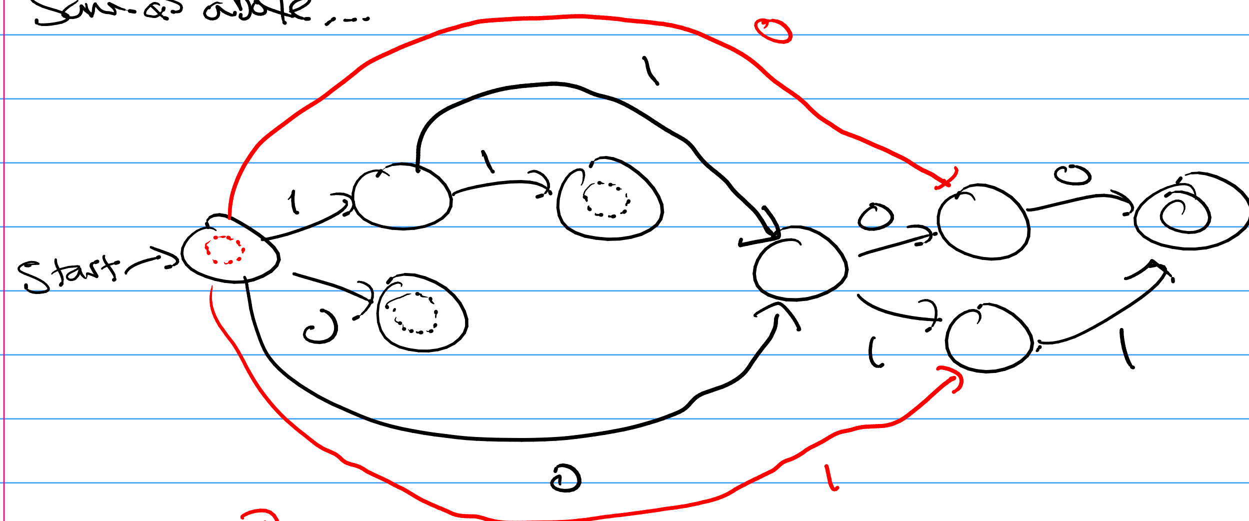


finals of M_A

back up one step, use same symbol to goto start of M_B

[ex] Same as above, ...

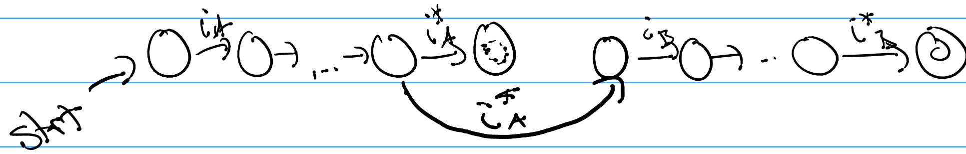
M_{AB}:



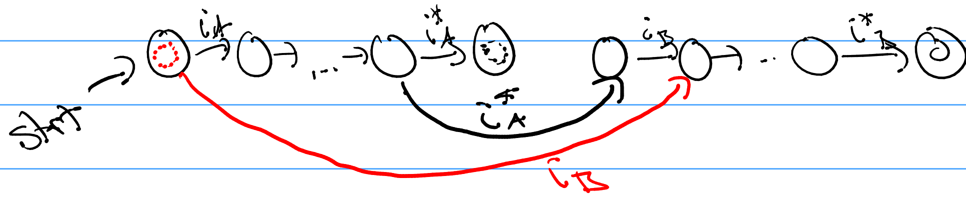
$a = \lambda$

$ab = \lambda b = b$

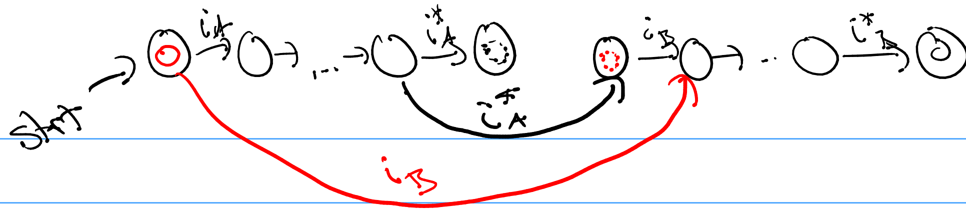
M_{AB}:



M_{AB}:

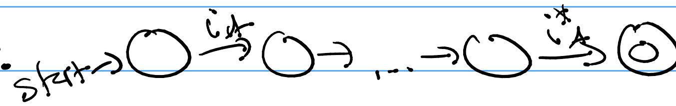


M_{AB}:

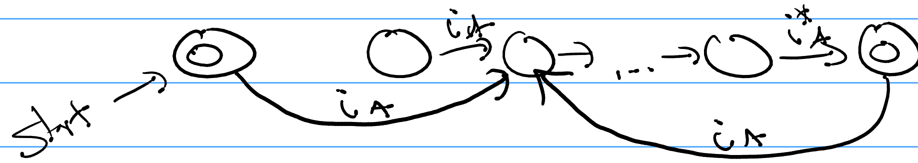


$A^* = \Lambda, A, A^2, A^3, \ldots$

M_A:



M_{A^*}:



ex

M_{A^*}:

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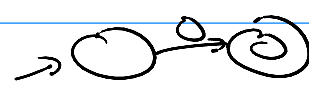
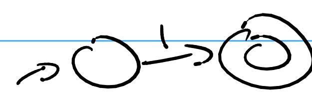
ex 3 $\quad 01^* \cup 00$

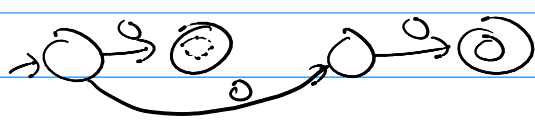
M_0:



M_1:

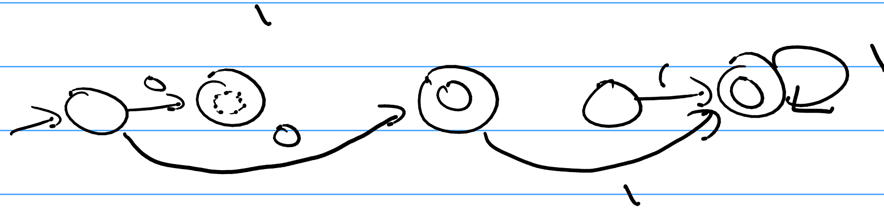


M_{00}:

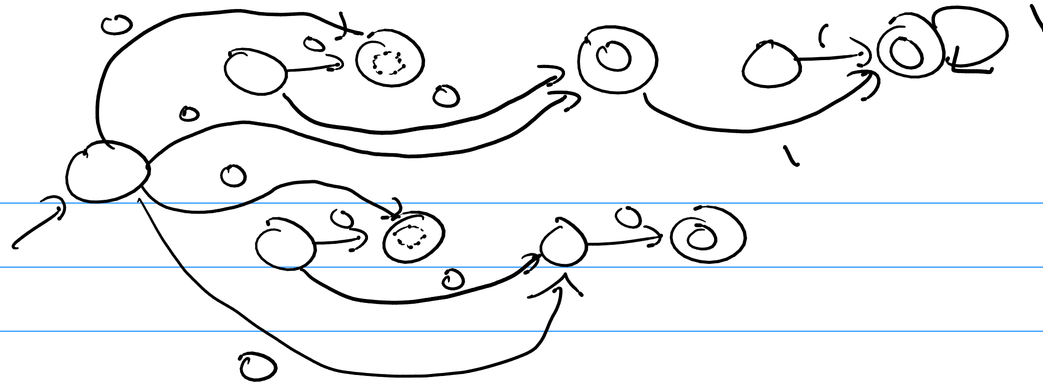


M_{1^*}:

M_{01^*}:

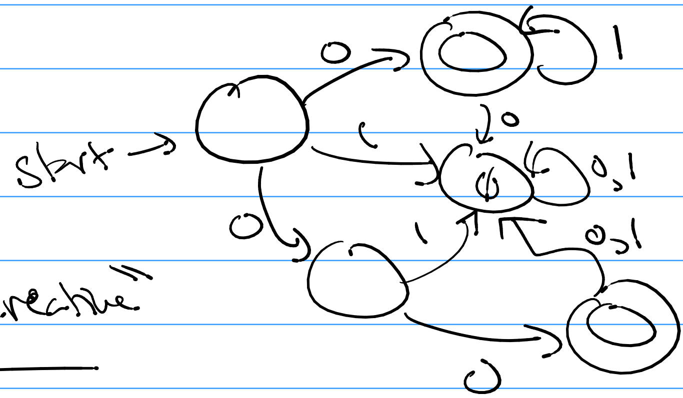


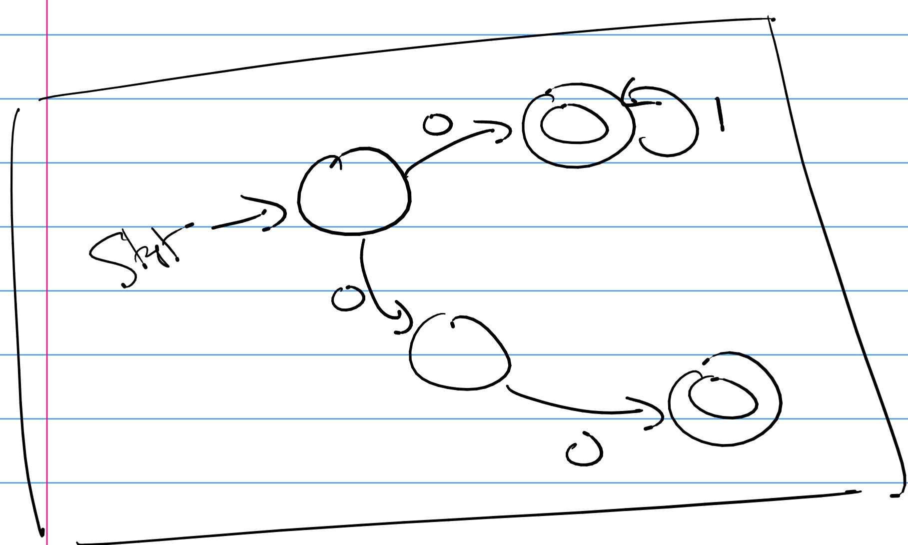
$M_{0^*,00}$:



$M_{01^*,00}$:

by being "creative"





Thm: A set is generated by a regular grammar **iff** it is regular

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productions

$S \to \lambda$

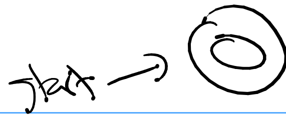
$A \to a$

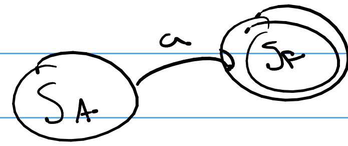
$A \to aB$

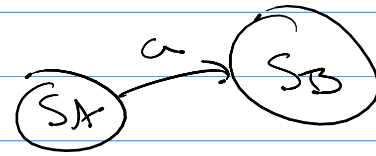
regular grammar $\leftrightarrow$ FSA

FSA $\leftrightarrow$ regular language

regular grammar $\leftrightarrow$ regular language (regular set)

(1) $S \to \lambda$ M_{1}: 

(2) $A \to a$ $M_{\text{part f-2}}$ 

(3) $A \to aB$ $M_{\text{part f-3}}$ 

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ex regular grammar

Productions are $\{ S \to \lambda,\ S \to aB,\ S \to a,$
$B \to bA,\ A \to b,\ B \to c \}$