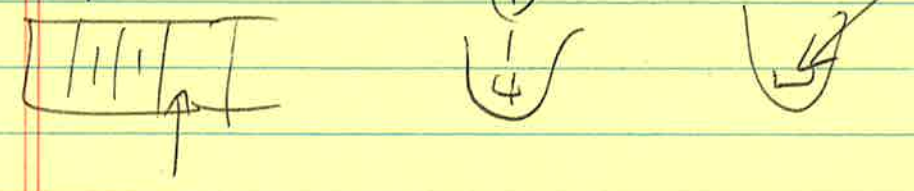
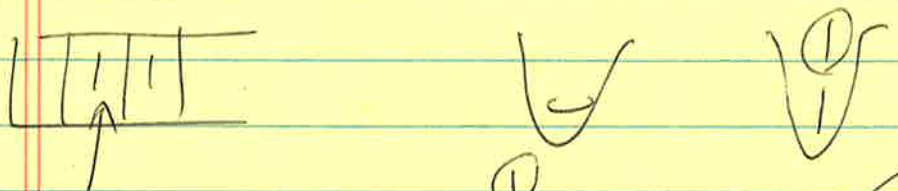
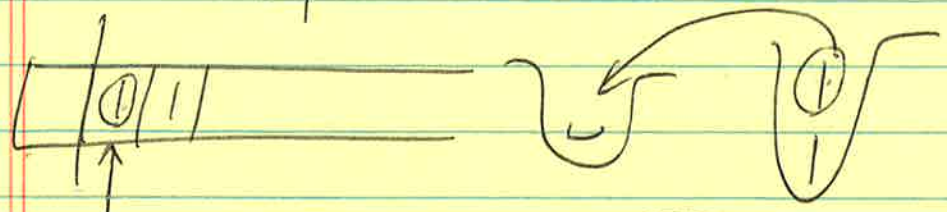
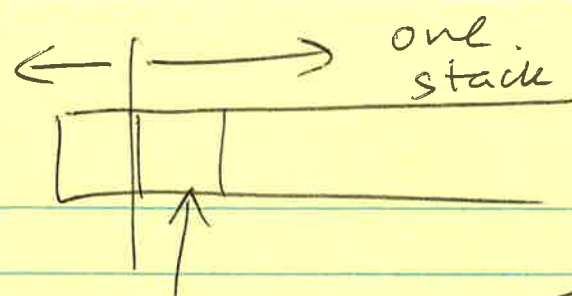
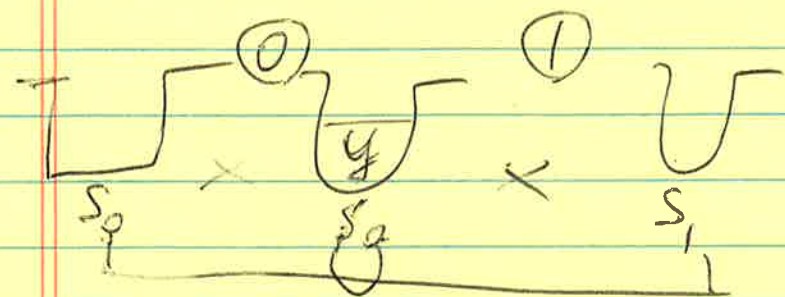
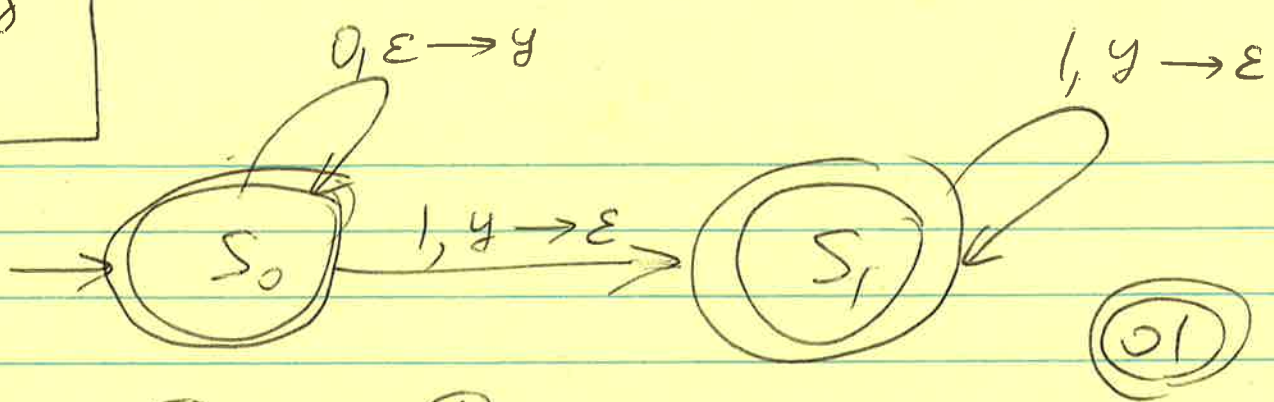


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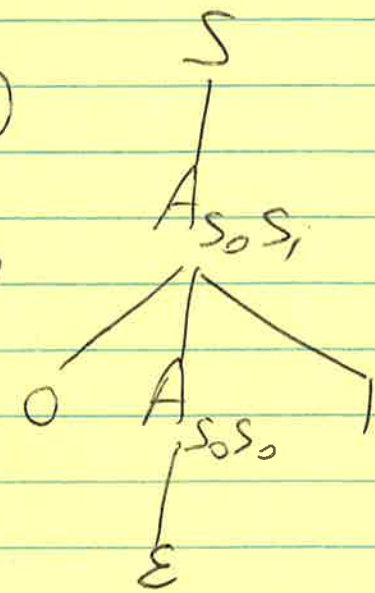
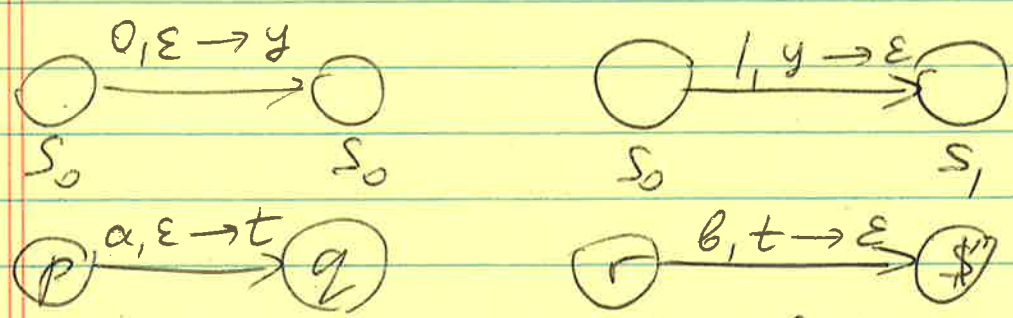


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$a, b \rightarrow c$
 \uparrow we see
 \downarrow we pop
 \rightarrow we push

$S \rightarrow A_{S_0 S_1}$



$A_{ps} \rightarrow a A_{qr} b$

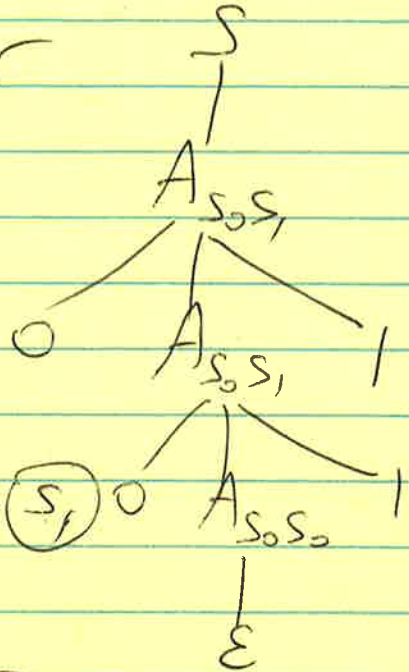
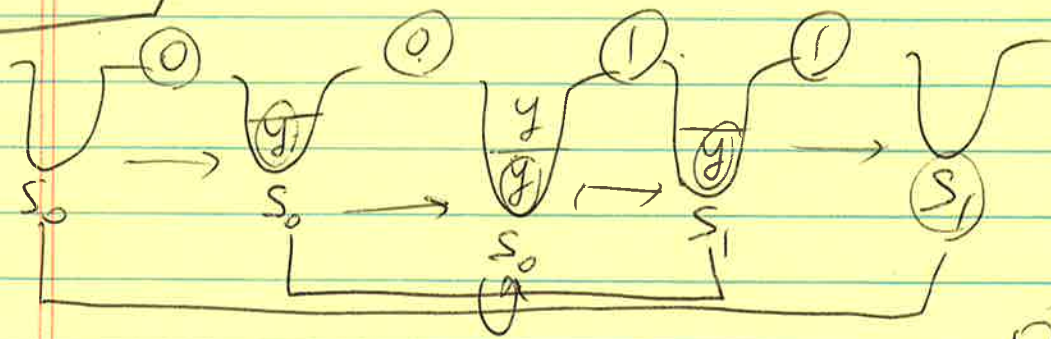
$A_{S_0 S_1} \rightarrow 0 A_{S_0 S_0} 1$

$A_{pp} \rightarrow \epsilon$

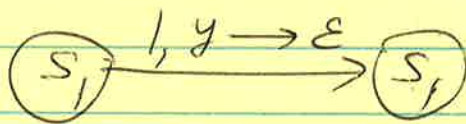
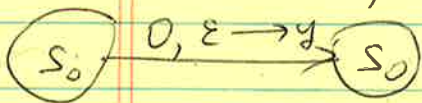
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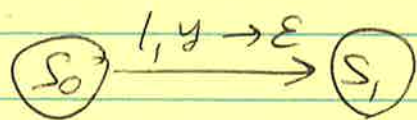
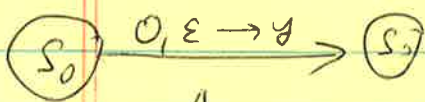
0011



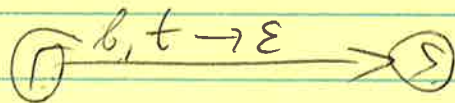
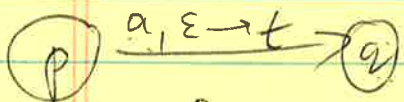
$$S \rightarrow A_{s_0 s_1}$$



$$A_{s_0 s_1} \rightarrow 0 A_{s_0 s_1} 1$$



$$A_{s_0 s_1} \rightarrow 0 A_{s_0 s_0} 1$$

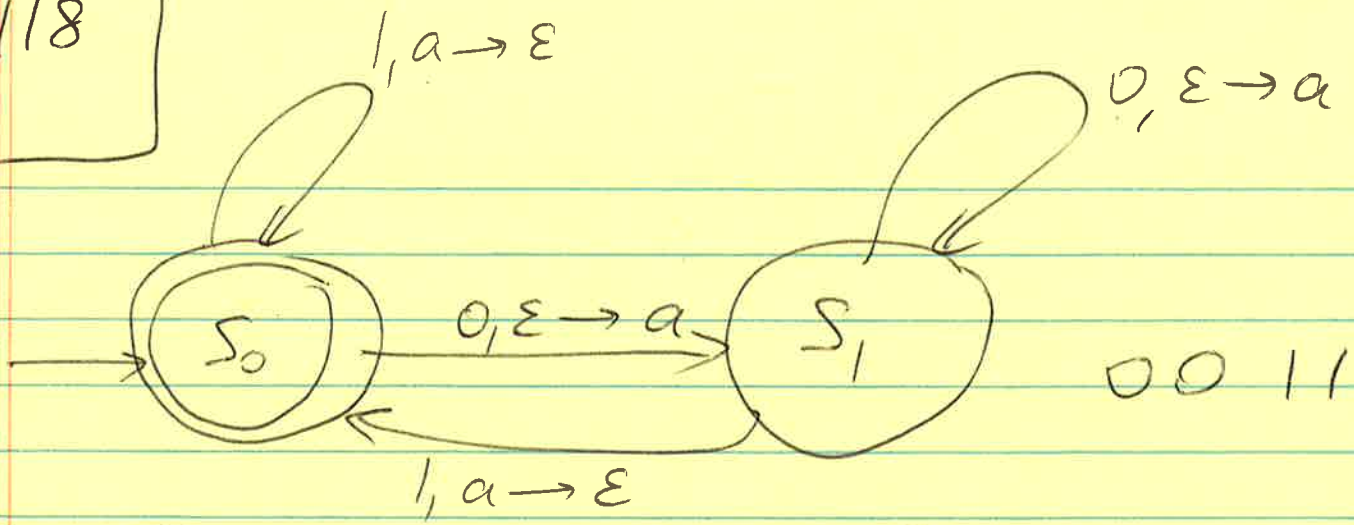


$$A_{ps} \rightarrow a A_{qt} b$$

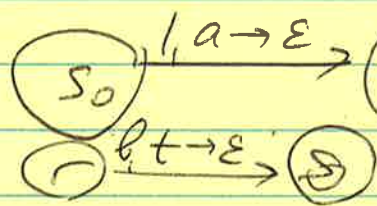
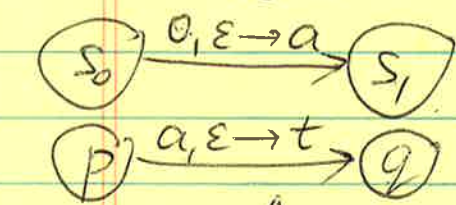
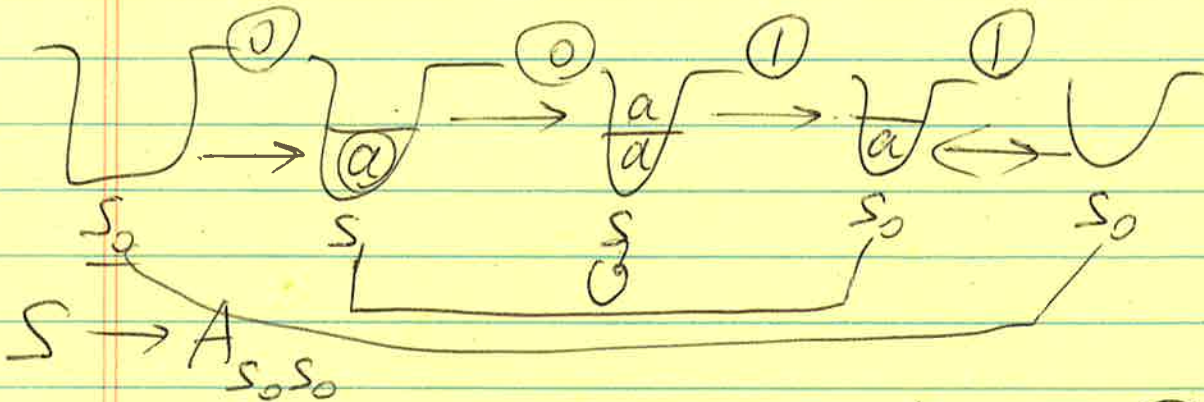
$$A_{s_0 s_1} \rightarrow 0 A_{s_0 s_1} 1$$

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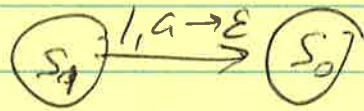
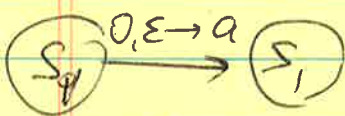
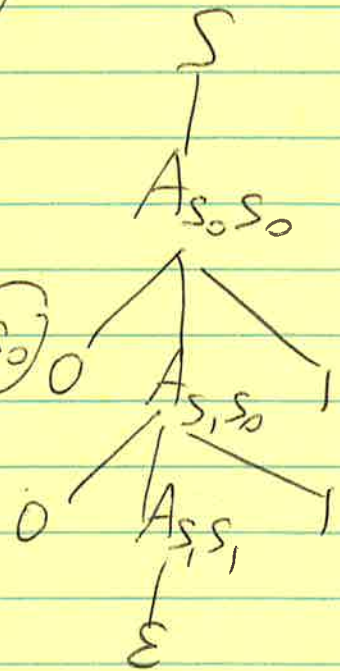


0011



$$A_{ps} \rightarrow a A_{qr} b$$

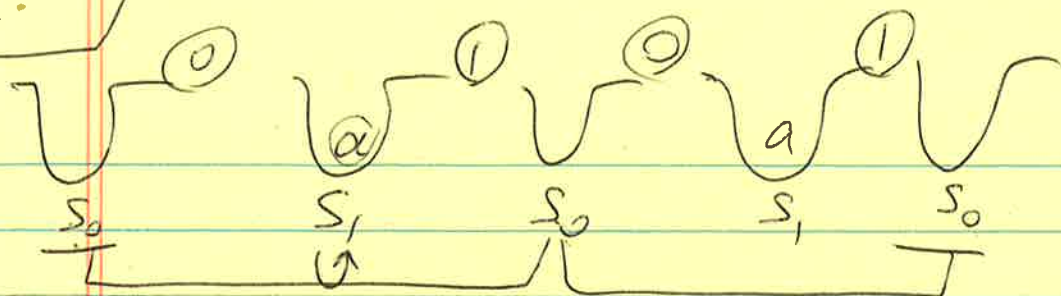
$$A_{S_0 S_0} \rightarrow 0 A_{S_1 S_0} 1$$



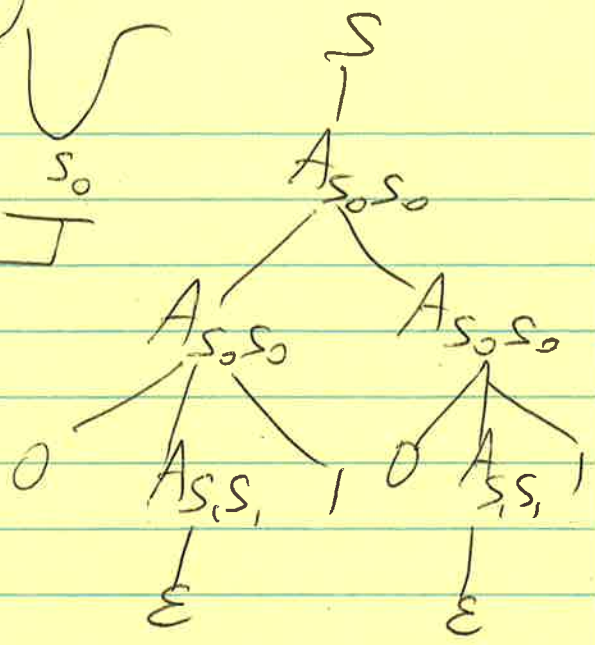
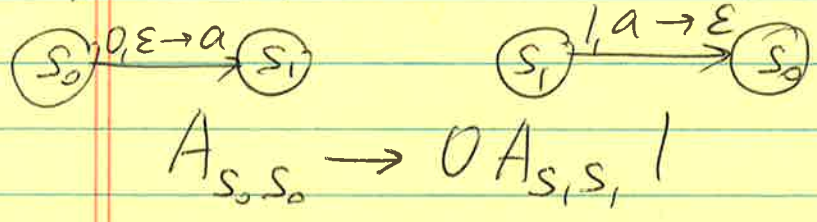
$$A_{S_1 S_0} \rightarrow 0 A_{S_1 S_1} 1$$

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0101



$S \rightarrow A_{s_0 s_0}$
 $A_{p r} \rightarrow A_{p q} A_{q r}$



11/26/18) Feasible vs not feasible

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$$2^n$$

$$n=500$$

$$2^{10} = 10^3$$

$$2^{500} = (2^{10})^{50} = (10^3)^{50} = 10^{150}$$

$$a^b \cdot a^c = a^{b+c}$$

$$(a^b)^c = a^{bc}$$

$$10^{150}$$

$$\underbrace{a \dots a}_b \cdot \underbrace{a \dots a}_c = a^{b+c}$$

$$\underbrace{a^b \dots a^b}_c = a^{bc}$$

$$\underbrace{a \dots a}_b \cdot \underbrace{a \dots a}_c \cdot \underbrace{a \dots a}_b = a^{bc}$$

$$10^{15} \frac{\text{oper}}{\text{sec}}$$

$$\frac{10^{150}}{10^{15}} = 10^{135} \frac{\text{sec}}{3 \cdot 10^7} = 3 \cdot 10^{127} \text{ years}$$

$$\frac{365 \cdot 24 \cdot 60 \cdot 60}{3 \cdot 10^7}$$

$$2 \cdot 10^{10} \text{ years}$$

$$f = O(g)$$

$$f \leq C \cdot g$$

Polynomial time

$$t_A(x) \leq P(\text{len}(x))$$