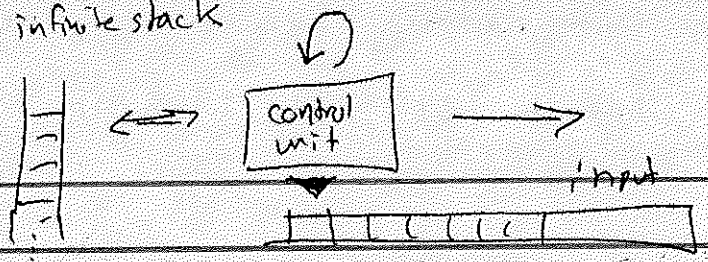
2-1

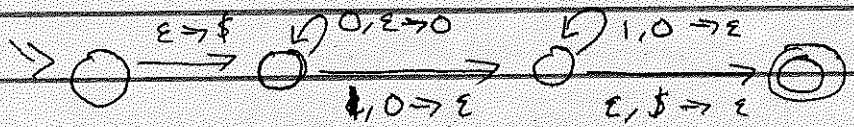
PDAs

infinite stack



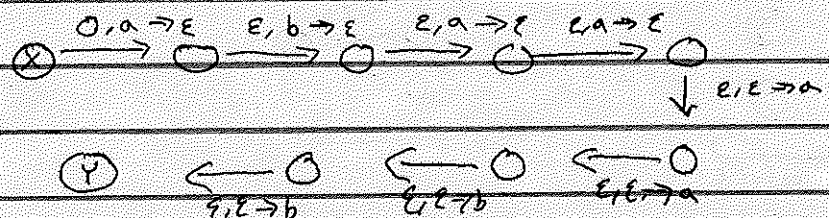
$0^n 1^n$

$S \to \varepsilon \mid 0S1$



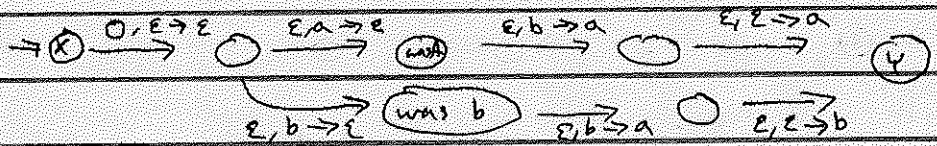
Suppose $\Gamma = \{a, b\}$, $q_i = X$

if input = 0 and stack = abaa ??... , then goto state = Y and stack = bbaa ??...



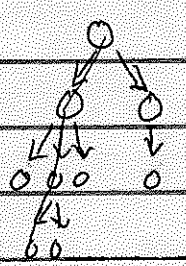
pre stack = ? b

post stack = ? a

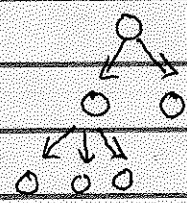


$\forall g \in CFG,\ \exists p \in PDA.\ L(g) = L(p)$

ND_K-PDA



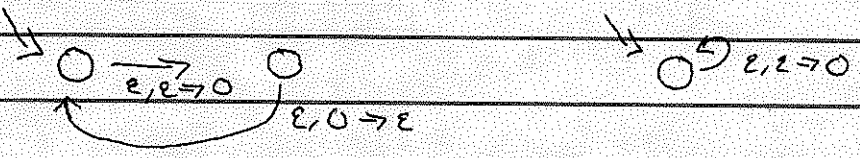
PDA



D-PDA

12-2/ DFAs have finite runtime because they are input-enabled

PDAs can interact w/ stack whenever



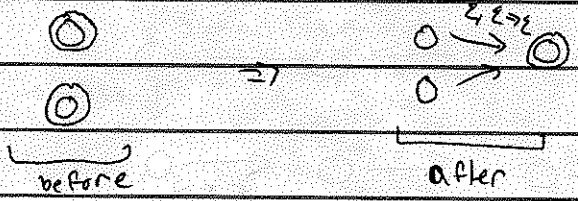
if it will say yes, it will in "finite time"

how do we know if it says no? they don't say "no"

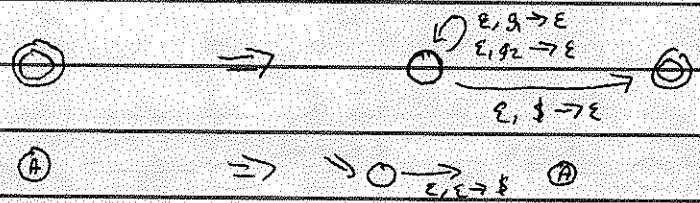
we can bound runtime don't say "yes"

$\forall p \in PDA.\ \exists g \in CFG.\ \ L(g) = L(p)$

assume there is a unique accept state

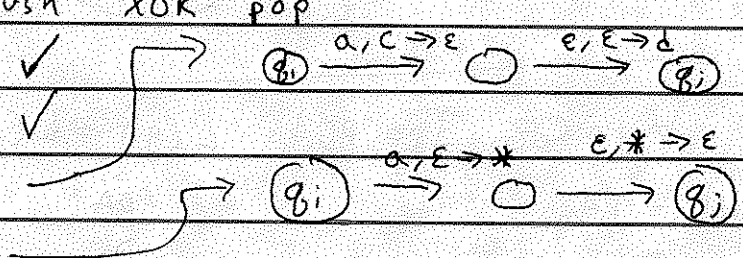


assume that stack is empty on accept



assume all transitions push XOR pop

pop	a, c → ε	✓
push	a, ε → d	✓
replace	a, c → d	
ignore	a, ε → ε	



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in: $(Q, \Sigma, \Gamma, q_0, \delta : Q \times \Sigma_\varepsilon \times \Gamma_\varepsilon \to P(Q \times \Gamma_\varepsilon),\ F = \{q_f\})$

out: (V, Σ, R, S)

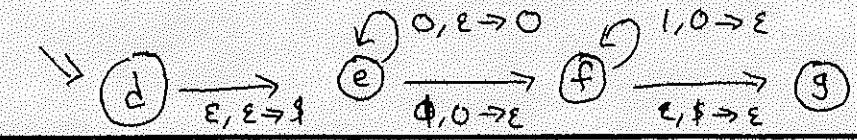
$V = Q \times Q$ (A_{pq}) $\quad S = A_{q_0, q_f}$

$A_{p,q} \Rightarrow^* w$ iff $[p]\,w \Rightarrow^* [q]$

12-3

$0^n 1^n$ where $n > 0$

PDA



CFG

→ A_{dg} A_{eg} A_{fg} $A_{gg} \Rightarrow \varepsilon$

A_{df} A_{ef} $A_{ff} \to \varepsilon$ A_{gf}

A_{de} $A_{ee} \to \varepsilon$ A_{fe} A_{ge}

$A_{dd} \to \varepsilon$ A_{ed} A_{fd} $A_{gd} \Rightarrow A_{gd} A_{dd} \mid A_{ge} A_{ed}$

$\mid A_{gf} A_{fd} \mid A_{gg} A_{gd}$

$\forall p \in Q$ $A_{pp} \to \varepsilon$

$\forall p, q, r \in Q$ $A_{pq} \to A_{pr} A_{rq}$

$A_{dg} \to \varepsilon A_{ef} \varepsilon$

$A_{ef} \to 0 A_{eg} 1$

$A_{ef} \to 0 A_{ef} 1$

$(r, t) \in \delta(p, a, \varepsilon)$

$(q, \varepsilon) \in \delta(s, b, t)$

$A_{pq} \to a A_{rs} b$

$\forall$ $p, q, r, s \in Q$ $t \in \Gamma$ $a, b \in \Sigma_\varepsilon$

$A_{dg} \to A_{ef} \mid A_{dg} A_{gg}$ $A_{gg} \to \varepsilon$

$A_{ef} \to 0 A_{ee} 1 \mid 0 A_{ef} 1$

$A_{ee} \to \varepsilon$

$S \to 01 \mid 0S1$