Pushdown Automata

(

$Q\ -\ set\ of\ states$

$\Sigma\ -\ input\ alphabet$

$\Gamma\ -\ stack\ alphabet$

$\delta\text{:}\ Q \times \Sigma_{\epsilon} \times \Gamma_{\epsilon} \rightarrow P(Q \times \Gamma_{\epsilon})\ -\ transition\ function$

$q_o \in Q\ -\ start\ state$

$F \subseteq Q\ -\ accept\ states$

)

Turing machine

(

$Q\ -\ set\ of\ states$

$\Sigma\ -\ input\ alphabet$ (without ⋄ - blank symbol)

Γ $-$ tape alphabet (⋄$\in\ \Gamma, \Sigma \subseteq \Gamma$)

$\delta\text{:}\ Q \times \Gamma \rightarrow Q \times \Gamma \times \{L, R\}\ -\ transition\ function$

$q_o \in Q\ -\ start\ state$

$q_{accept} \in Q\ -\ accept\ state$

$q_{reject} \in Q\ -\ reject\ state,\ q_{reject} \neq q_{accept}$

)

uqv - Configuration (q - current state, u - tape.slice(0,current), v - tape.slice(current))
Configuration c_1 yields c_2 if can go from c_1 to c_2 in a single step
Start configuration - at q_0
Accepting and rejecting configurations are balting - halts execution in them
Language recognized by a turing machine is Turing-recognizable
Any state change can lead to accept, fail or loop (neither)

Pumping lemma
$s = uv^n xy^n z$ where n=0+. Show that it can't be pumped

Turing description:
1. Mark first unmarked 0. If none, go to 6.
   2. Move the head to the front
   3. Mark first unmarked 1. If none, reject
   4. Move the head to the front

5. Go to 1
6. Scan if there is any unmarked 1. If so, reject. Else accept