Theory of Computation

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Pushdown Automata

Example: Construct a PDA that accepts L = $\{a^n b^{n+1} \mid n >= 1\}$

$\delta(q_0, a, Z_0) = \{(q_0, aZ_0)\}$

$\delta(q_0, a, a) = \{(q_0, aa)\}$

$\delta(q_0, b, a) = \{(q_1, \wedge)\}$

$\delta(q_1, b, a) = \{(q_1, \wedge)\}$

$\delta(q_1, b, Z_0) = \{(q_2, Z_0)\}$

$\delta(q_2, \wedge, Z_0) = \{(q_f, Z_0)\}$

Example: Construct a PDA that accepts $L = \{a^n b^m \mid n > m \geq 0\}$

$\delta(q_0, a, Z_0) = \{(q_1, aZ_0)\}$

$\delta(q_1, a, a) = \{(q_1, aa)\}$

$\delta(q_1, b, a) = \{(q_2, \wedge)\}$

$\delta(q_2, b, a) = \{(q_2, \wedge)\}$

$\delta(q_2, \wedge, a) = \{(q_2, \wedge)\}$

$\delta(q_1, \wedge, a) = \{(q_2, \wedge)\}$

Example: Construct a PDA for accepting the language L = $\{a^n b^m c^n \mid m,n>=1\}$

$\delta(q_0, a, z_0) = \{(q_0, az_0)\}$

$\delta(q_0, a, a) = \{(q_0, aa)\}$

$\delta(q_0, b, a) = \{(q_1, a)\}$

$\delta(q_1, b, a) = \{(q_1, a)\}$

$\delta(q_1, c, a) = \{(q_2, \wedge)\}$

$\delta(q_2, c, a) = \{(q_2, \wedge)\}$

$\delta(q_2, \wedge, z_0) = \{(q_f, z_0)\}$ OR $\{(q_f, \wedge)\}$