Tutorial 6 : Pushdown Automata

1) Give a PDA for the language $L_1 = \{a^n bba^n \mid n \geq 0\}$

   Solution :
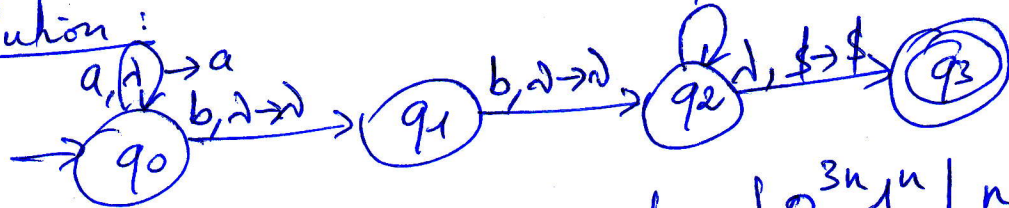
   Transitions shown: q_0: $a, \lambda \to a$; $b, \lambda \to \lambda$; then q_1: $b, \lambda \to \lambda$; then q_2: $a, a \to \lambda$ (self-loop), $\lambda, \$ \to \$$; to q_3

2) Give a PDA for the language $L_2 = \{0^{3n} 1^n \mid n \geq 0\}$

   Transitions: q_0: $0, \lambda \to 0$ (self-loop), $1, 000 \to \lambda$; then q_1: $1, 000 \to \lambda$ (self-loop), $\lambda, \$ \to \$$; to q_2
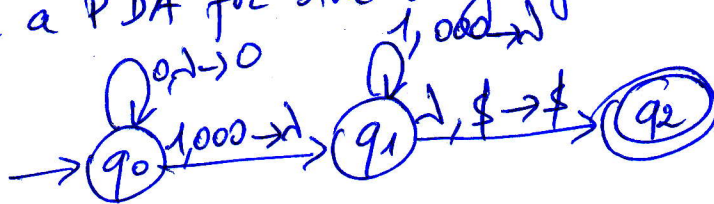
3) Give a PDA for the language $L_3 = \{w \mid w = u \# v \mid u, v \in \{a, b\}^+ \text{ and } |u| = |v|\}$

   Transitions: q_0: $a, \lambda \to x$; $b, \lambda \to x$ (self-loop), $\#, \lambda \to \lambda$; then q_1: $a, x \to \lambda$; $b, x \to \lambda$ (self-loop), $\lambda, \$ \to \$$; to q_2