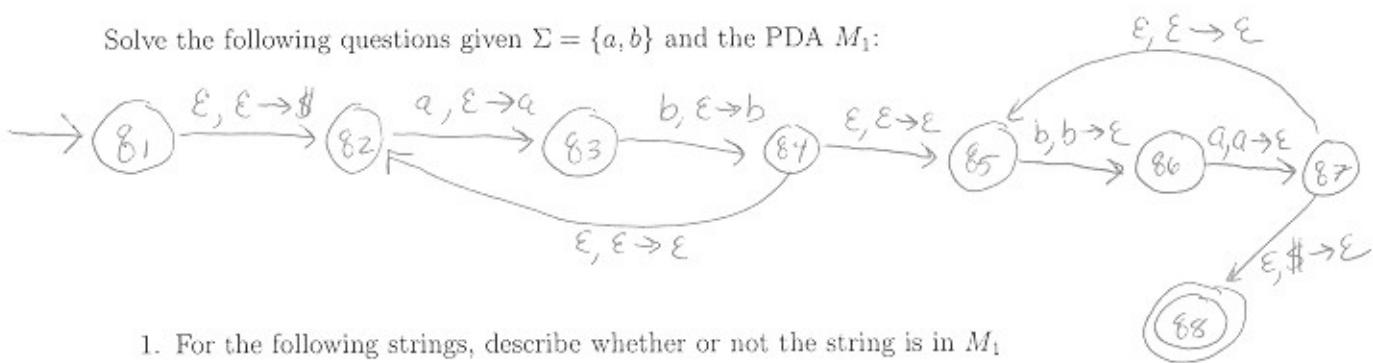


Name & Honor Code: _____

Solve the following questions given $\Sigma = \{a, b\}$ and the PDA M_1 :

1. For the following strings, describe whether or not the string is in
- M_1

- (a) ababab $\notin M_1$,
 (b) ababbaba $\in M_1$,
 (c) bababa $\notin M_1$,
 (d) abba $\in M_1$,

2. What language does
- M_1
- recognize?

$$L(M_1) = \{ w \mid w \text{ is } (ab)^n(ba)^n \text{ and } n \geq 1 \}$$

3. Give the formal description of the PDA as a formal 6-tuple.

$$M_1 = (Q, \Sigma, \Gamma, \delta, q_0, F)$$

$$Q = \{q_1, q_2, q_3, q_4, q_5, q_6, q_7, q_8\} \quad \Sigma = \{a, b\} \quad \Gamma = \{a, b, \$\} \quad q_0 = q_1 \quad F = \{q_8\}$$

4. Write a grammar that recognizes the same language as
- M_1
- .

$$S \rightarrow abSba \mid abba$$

6

Input	a	b	c
Stack	a	$b\$ \epsilon$	$a b \$ \epsilon$
q_1			
q_2			$\{(q_2, \$)\}$
q_3			
q_4			
q_5			
q_6	$\{\{q_7, \epsilon\}\}$		
q_7			$\{(q_8, \epsilon)\}, \{(q_2, \epsilon)\}$
q_8			$\{(q_8, \epsilon)\}, \{(q_5, \epsilon)\}$