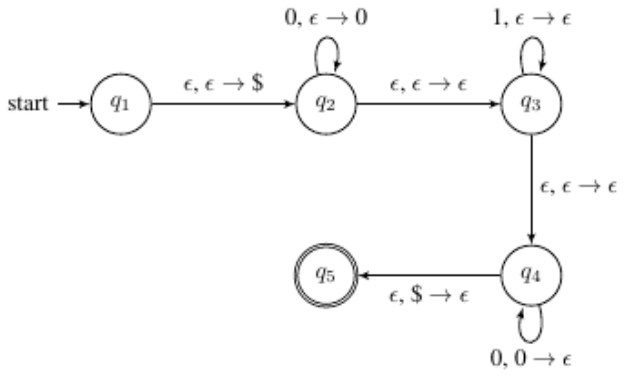
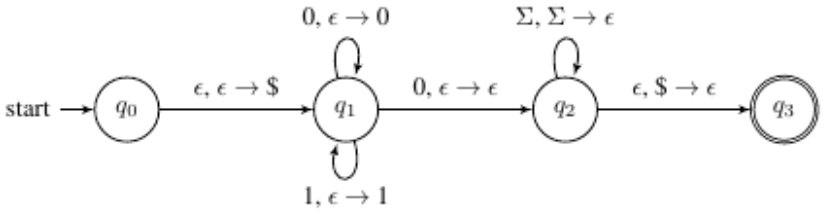
Chapter 2.3 Practice Key

Give state diagrams of PDAs that accepts the following languages. $\Sigma = \{0, 1\}$.

1. $\{0^n 1^m 0^n | m, n \geq 0\}$



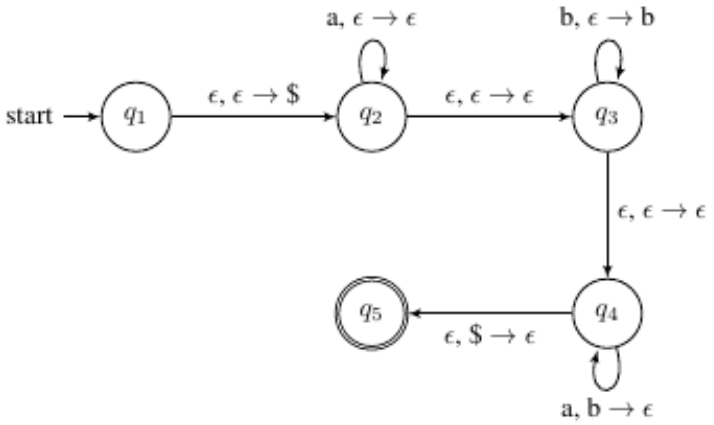
2. $\{w \in \{0,1\}^* |$ the length of w is odd and the middle symbol is 0$\}$



Draw a PDA from the formal definitions of the languages below and determine the strings that the language recognizes.

3. $Q = \{q_1, q_2, q_3, q_4, q_5\}$
   $\Sigma = \{a, b\}$
   $\Gamma = \{\$, b\}$
   $q_0 = q_1$
   $F = \{q_5\}$
   $\delta =$

Input	a				b				ε			
Pop	a	b	$	ε	a	b	$	ε	a	b	$	ε
q_1												{(q2,$)}
q_2				{(q2,ε)}								{(q3,ε)}
q_3								{(q3,b)}				{(q4,ε)}
q_4		{(q4,ε)}									{(q5,ε)}	
q_5												



Strings are: $\{a^n b^m a^m | m, n \geq 0\}$

4. $Q = \{q_1, q_2, q_3, q_4, q_5\}$

$\Sigma = \{a, b\}$

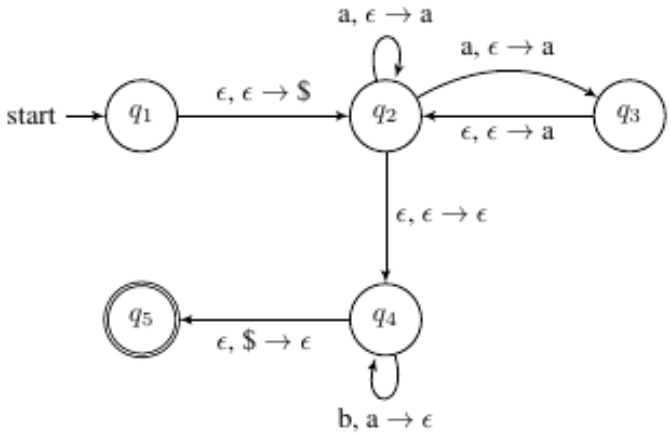
$\Gamma = \{\$, a\}$

$q_0 = q_1$

$F = \{q_5\}$

$\delta =$

Input	a				b				ε			
Pop	a	b	$	ε	a	b	$	ε	a	b	$	ε
q_1												$\{(q_2,\$)\}$
q_2				$\{(q_2,a)\}$ $\{(q_3,a)\}$								$\{(q_4,\varepsilon)\}$
q_3												$\{(q_2,a)\}$
q_4					$\{(q_4,\varepsilon)\}$						$\{(q_5,\varepsilon)\}$	
q_5												



Strings are: $\{a^n b^m a^m | m, n \geq 0\}$

5. $Q = \{q_1, q_2, q_3, q_4, q_5\}$

   $\Sigma = \{a, b, c\}$

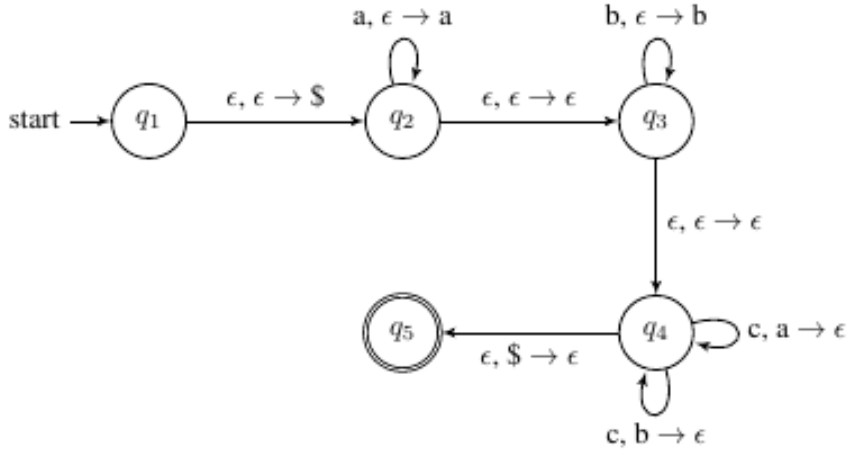
   $\Gamma = \{\$, a, b\}$

   $q_0 = q_1$

   $F = \{q_5\}$

   $\delta =$

In	a				b				c				ε			
Pop	a	b	$	ε	a	b	$	ε	a	b	$	ε	a	b	$	ε
q_1																$\{(q_2,\$)\}$
q_2				$\{(q_2,a)\}$												$\{(q_3,\varepsilon)\}$
q_3								$\{(q_3,b)\}$								$\{(q_4,\varepsilon)\}$
q_4									$\{(q_4,\varepsilon)\}$	$\{(q_4,\varepsilon)\}$					$\{(q_5,\varepsilon)\}$	
q_5																



Strings are: $\{a^i b^j c^k | i, j, k \geq 0, i + j = k\}$