Question 1:

1. For the symbols (letters) a, b define the following:
   
   a. String

   b. Language

   c. Alphabet

   d. Empty string (lambda )

   e. If string X=aaab, and string Y=babaab
      
      i. Then the length of X, Y and XY are …………. …………. …………
      
      ii. XY=…………………………………. and YX=………………………………..
2. Let $\sum = \{0, 11\}$. Find:

(a) $\sum^*$

(b) $\sum^3$

(c) $\sum^*$

(d) $\sum^0$

(e) $\sum^2$
3. Answer the following Questions:
   (a) What is TOC

   (b) Differentiate between the types of finite automata (FA)

   (c) What are the five tuple of FA
Question 2:
1. Check whether the strings \{10011, 010110, 1001011 and 10110\} are accepted or rejected when examine the automaton shown below

2. Build a DFA automaton that accepts all and only those strings that contain 1001
3. For the DFA shown in the following Figure construct the transition table and define the transition function.
4. Draw the **state diagram** for a DFA described by the following transition table. Also obtain the transition function.

<table>
<thead>
<tr>
<th>Q</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>q₀</td>
<td>q₁</td>
<td>q₂</td>
</tr>
<tr>
<td>q₁</td>
<td>q₂</td>
<td>q₃</td>
</tr>
<tr>
<td>q₂</td>
<td>q₀</td>
<td>q₃</td>
</tr>
<tr>
<td>*q₃</td>
<td>q₃</td>
<td>q₃</td>
</tr>
</tbody>
</table>