Question 1

- What is the state diagram of the string the even numbers of 0's and 1's.

0101, 1100, 11011000
Question 1 answer

1010

Diagram:

- States: $q_0$, $q_1$, $q_2$, $q_3$
- Transitions:
  - $q_0$ to $q_1$: 1
  - $q_1$ to $q_0$: 1
  - $q_0$ to $q_3$: 0
  - $q_3$ to $q_0$: 0
  - $q_1$ to $q_2$: 0
  - $q_2$ to $q_1$: 0
  - $q_2$ to $q_3$: 1
  - $q_3$ to $q_2$: 1
What is the state diagram of the set of strings consisting of n 0's followed by n 1's \{ 01, 0011, 000111, \ldots \}\?
Question 2 answer
Question 3

- what is the state diagram of the set of strings consisting of 0 followed by 1 and then 0 then 1 …etc and ended by 0

- \{010, 01010, 010101010\ldots\}?
Question 3 answer

\[
\begin{align*}
q_1 & \quad \text{on input } 1 \text{ go to } q_2 \\
& \quad \text{on input } 0 \text{ stay } \\
& \quad \text{on input } 1 \text{ go to } q_1 \\
q_2 & \quad \text{on input } 0 \text{ go to } q_2 \\
& \quad \text{on input } 1 \text{ go to } q_2 \\
\end{align*}
\]
**Question 4**

- What is the state diagram for FA? If \( FA = (S, I, \delta, s_0, F) \) be a finite automaton with \( S = \{s_0, s_1, s_2\} \), \( I = \{a, b, c, d, e, f\} \), \( F = \{s_0\} \), and with the following transition rules in \( \delta \):

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>s0</td>
<td>s1</td>
<td>φ</td>
<td>φ</td>
<td>φ</td>
<td>φ</td>
<td>φ</td>
</tr>
<tr>
<td>s1</td>
<td>φ</td>
<td>s1</td>
<td>s2</td>
<td>s2</td>
<td>φ</td>
<td>φ</td>
</tr>
<tr>
<td>s2</td>
<td>φ</td>
<td>φ</td>
<td>φ</td>
<td>φ</td>
<td>s0</td>
<td>s0</td>
</tr>
</tbody>
</table>
Question 4 answer
Question 4 answer
Question 5 (text book EXERCISES P.83 No1.1)

- The following are the state diagrams of two DFAs, M1 and M2. Answer the following questions about each of these machines.
a. What is the start state?
for M1: q1 and M2: q1

b. What is the set of accept states?
for M1: \{ q2 \} and M2: \{ q1, q4 \}

c. What sequence of states does the machine go through on input aabb?
for M1: q1, q2, q3, q1, q1 and M2: q1, q1, q2, q4

d. Does the machine accept the string aabb?
M1: no it does not and M2: yes it does

e. Does the machine accept the string \( \varepsilon \) ?
no