1. Give a non-deterministic finite automaton for the following regular expression:

\[((a^*bc^*)|(ab^*c))\]

**Answer:**

Here is one possible NFA—yours may look different. 1 is the start state.

![Diagram](image1.png)

2. Give a deterministic version of the finite automaton, using the construction we described in class. Provide both the graphical representation of the automaton as well as the state transition diagram.

**Answer:**

Here is the state transition table, as built through the subset construction:

<table>
<thead>
<tr>
<th>States</th>
<th>s1</th>
<th>s2</th>
<th>s3</th>
<th>s4</th>
<th>s5</th>
<th>s6</th>
<th>s7</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>λ</td>
<td>2</td>
<td>3</td>
<td>λ</td>
<td>λ</td>
<td>λ</td>
<td>λ</td>
</tr>
<tr>
<td>b</td>
<td>λ</td>
<td>2</td>
<td>3</td>
<td>λ</td>
<td>λ</td>
<td>λ</td>
<td>λ</td>
</tr>
<tr>
<td>c</td>
<td>λ</td>
<td>λ</td>
<td>λ</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

1

1
3. Derive the reduced DFA. Provide both the graphical representation of the automaton as well as the state transition diagram.

**Answer:** New states 3 and 8 can be merged. No others can be merged.