Do Exercises 1.4(c,e), 1.5(d,f), 1.6(c,l), 1.7(b,c), 1.16(b).

Here are the exercises written out for the purpose of comparing your book version’s exercises with mine. You must do the exercises as worded below.

Exercise 1.4: Each of the following languages is the intersection of two simpler languages.
In each part, construct DFAs for the simpler languages, then combine them using the construction discussed in footnote 3 (page 46) to give the state diagram of a DFA for the language given. In all parts, \( \Sigma = \{a,b\} \).

c. \( \{w \mid w \text{ has an even number of a’s and one or two b’s}\} \)

e. \( \{w \mid w \text{ starts with an a and has at most one b}\} \)

Exercise 1.5: Each of the following languages is the complement of a simpler language.
In each part, construct a DFA for the simpler language, then use it to give the state diagram of a DFA for the language given. In all parts, \( \Sigma = \{a,b\} \).

d. \( \{w \mid w \text{ is any string not in } a^*b^*\} \)

f. \( \{w \mid w \text{ is any string not in } a^* \cup b^*\} \)

Exercise 1.6: Give state diagrams of DFAs recognizing the following languages. In all parts, the alphabet is \( \{0,1\} \).

c. \( \{w \mid w \text{ contains the substring 0101 (i.e., } w = x0101y \text{ for some } x \text{ and } y)\} \)

l. \( \{w \mid w \text{ contains an even number of 0’s or contains exactly two 1’s}\} \)

Exercise 1.7: Give state diagrams of NFAs with the specified number of states recognizing each of the following languages. In all parts, the alphabet is \( \{0,1\} \).

b. The language of Exercise 1.6c with five states

c. The language of Exercise 1.6l with six states
Exercise 1.16: Use the construction given in Theorem 1.39 to convert the following two nondeterministic finite automata to equivalent deterministic finite automata.

b. [Given in tabular form:]

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>$\varepsilon$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rightarrow 1$</td>
<td>${3}$</td>
<td>$\emptyset$</td>
<td>${2}$</td>
</tr>
<tr>
<td>$\rightarrow 2$</td>
<td>${1}$</td>
<td>$\emptyset$</td>
<td>$\emptyset$</td>
</tr>
<tr>
<td>$\rightarrow 3$</td>
<td>${2}$</td>
<td>${2,3}$</td>
<td>$\emptyset$</td>
</tr>
</tbody>
</table>