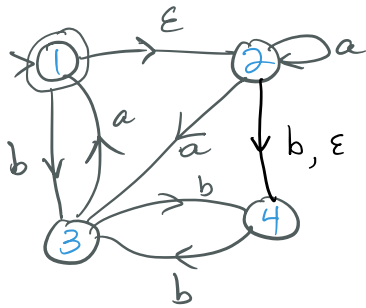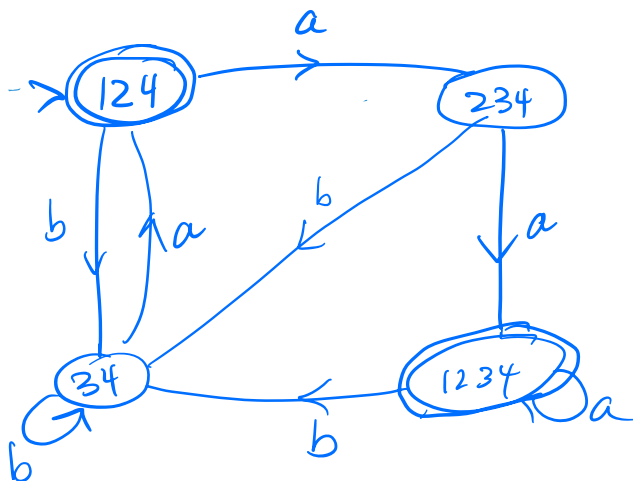# A2

Will mark 3 out of 5   (Hint: don't skip Pumping Lemma)
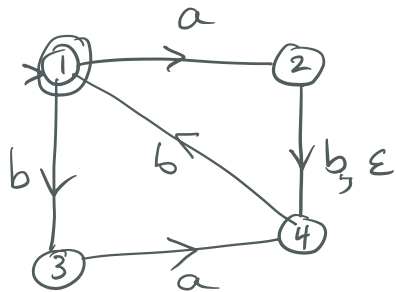
1. Use the **construction** to find a DFA that is equivalent to the following NFA.   [8 marks]

	a	b
1	∅	3
2	234	4
3	124	4
4	∅	3
> 124	234	34
34	124	34
234	1234	34
1234	1234	34

* 2. Use the construction to find a regular expression for the language recognized by the following FA:

[8 marks]

3. Use the construction to find an NFA equivalent to the r.e. $(bb + a)^* ab^*$ [4 marks]

4. By whatever method you wish, give r.e.'s for: [8 marks]

a) $\{w \in \{0,1\} \mid$ blocks of 0's have odd parity, blocks of 1's have even parity $\}$

b) $\{w \in \{0,1\} \mid$ every 011 is followed eventually by 1010 $\}$.

c) $\{w \in \{a,b\} \mid aba$ is not a substring $\}$

Hint: b) "no 011" is $1^*(0+10)^*(1+\varepsilon)$

*5. Prove that the following language is not regular:

$$L_{sum} = \{ a^i b^j c^{i+j} \mid i, j \in W \} \quad [8 \text{ marks}]$$

$(W = \{ 0, 1, 2, \ldots \})$