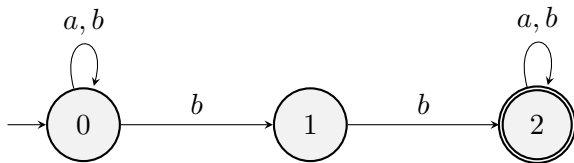


Theories of Computation: Formative Assignment 1

To be handed in on Canvas before **Thursday 17th February, 5pm GMT**

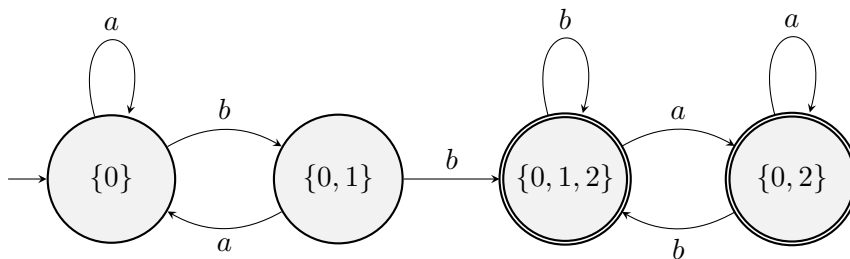
Exercise 1 We consider the alphabet $\Sigma = \{a, b\}$. We want to design a finite automaton that recognises the language \mathcal{L} of the strings that do **NOT** contain the substring “bb”.

We start with the following non-deterministic automaton \mathcal{N} that recognises the complement of language \mathcal{L} , that is, the set of strings that **DO** contain the substring “bb”:

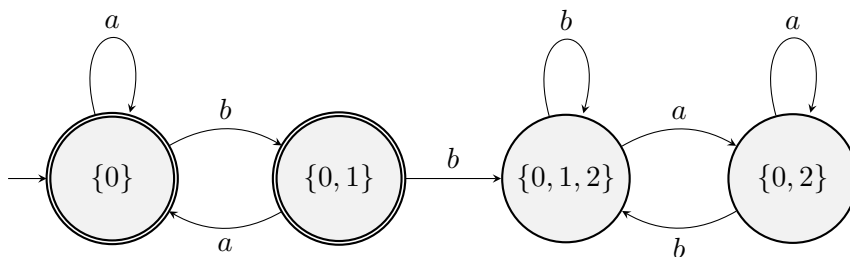


1. Use the determinisation procedure to transform this automaton \mathcal{N} into a deterministic finite automaton \mathcal{D} that recognises the same language. [4 marks]
2. Transform \mathcal{D} into an automaton that recognises the language \mathcal{L} . [3 marks]
3. Show that, if you were to apply the same transformation as in step 2 to the non-deterministic automaton \mathcal{N} , the language of the obtained automaton would not be \mathcal{L} . [3 marks]

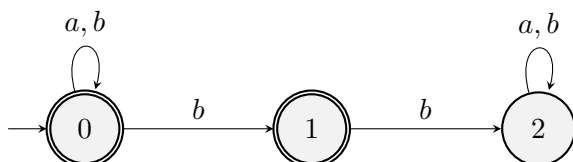
Solution 1 1.



2.



3.



The automaton accepts the word *bb* which is not in \mathcal{L} .