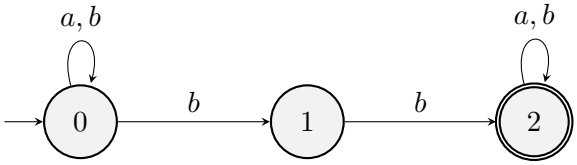
Theories of Computation: Formative Assignment 1

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]**