

COMP 615 (Fall 2021): HW 3

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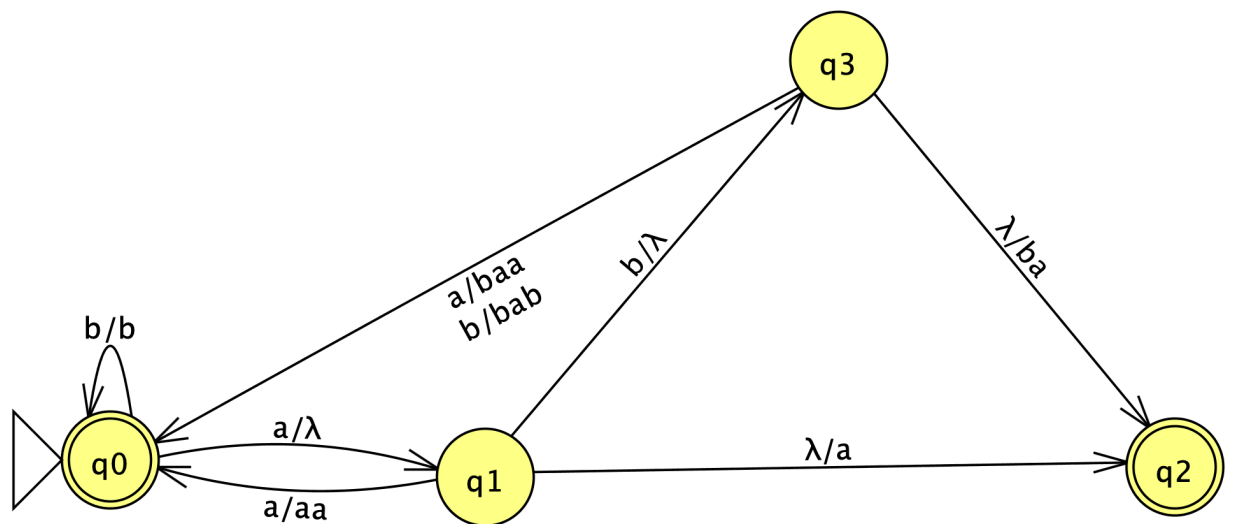
Student ID: 202048619

Section: Mon (7:00 pm – 9:45 pm)

COMP 615 HW 3: Finite State Transducers and 2DFAs

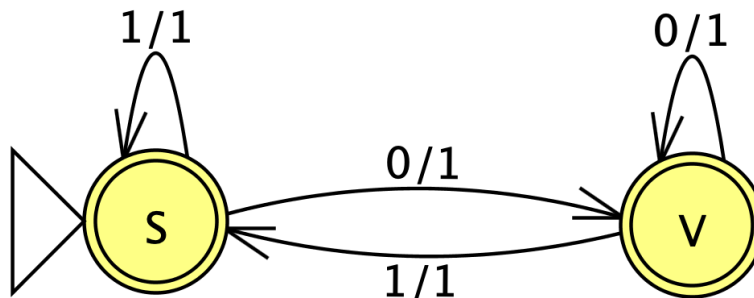
Problem 1. (10 points)

Create a Finite state transducer that takes a binary string as input and replaces any occurrence of ab with ba .



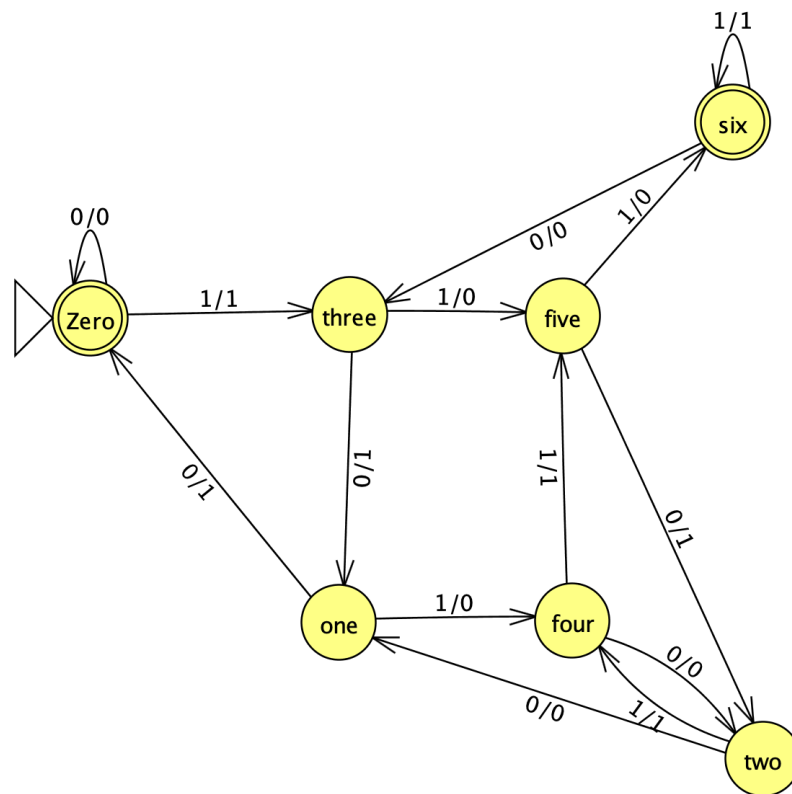
Problem 2. (10 points)

Create a finite state transducer that takes an input of a binary string and outputs that same string with all 0's replaced with 1's.



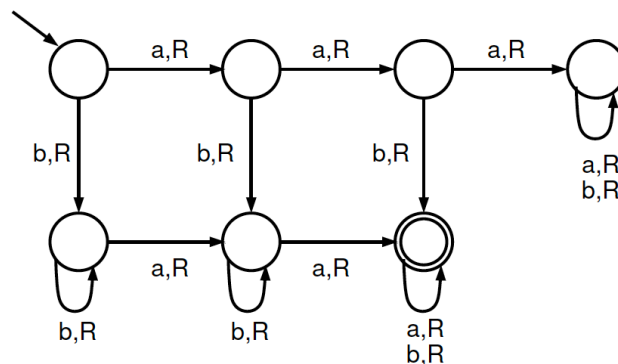
Problem 3. (10 points)

Create a Finite state transducer that take an input of a binary string and outputs a binary string with a value 7 times larger.



Problem 4. (10 points)

For the 2DFA below:



What strings cause the machine to fall off the string to the right in a final state?

Ans: $\{w \in \{a, b\}^* : \text{number of } a\text{'s has to be more than or equal two } (\#a \geq 2) \text{ \& one of first three characters is } b\}$

What strings cause the machine to fall off the string to the left in a final state? Ans: None

What strings cause the machine to fall off the string to the **right** in a **non-final** state?

Ans: $\{w \in \{a, b\}^* : w \text{ starts with } aaa \text{ or the number of } a\text{'s is less than two}\}$

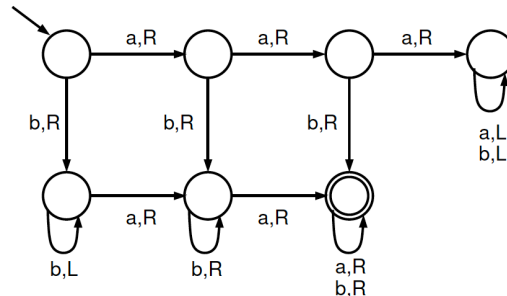
What strings cause the machine to fall off the string to the left in a non-final state?

Ans: None

What strings cause the machine to run forever? Ans: None

Problem 5. (10 points)

For the 2DFA below:



What strings cause the machine to fall off the string to the **right** in a **final** state?

Ans: $\{w \in \{a, b\}^* : \text{number of } a\text{'s has to be more than or equal two } (\#a \geq 2) \text{ \& one of first three characters is } b \text{ \& doesn't start with } b\}$

What strings cause the machine to fall off the string to the **left** in a **final** state?

Ans: None

What strings cause the machine to fall off the string to the **right** in a **non-final** state?

Ans: $\{w \in \{a, b\}^* : \text{the number of } a\text{'s is less than two \& doesn't start with } b \text{ or } w \text{ is } aaa\}$

What strings cause the machine to fall off the string to the **left** in a **non-final** state?

Ans: None

What strings cause the machine to run forever?

Ans: $\{w \in \{a, b\}^* : w \text{ starts with } aaaa \text{ or } aaab \text{ or } bb\}$