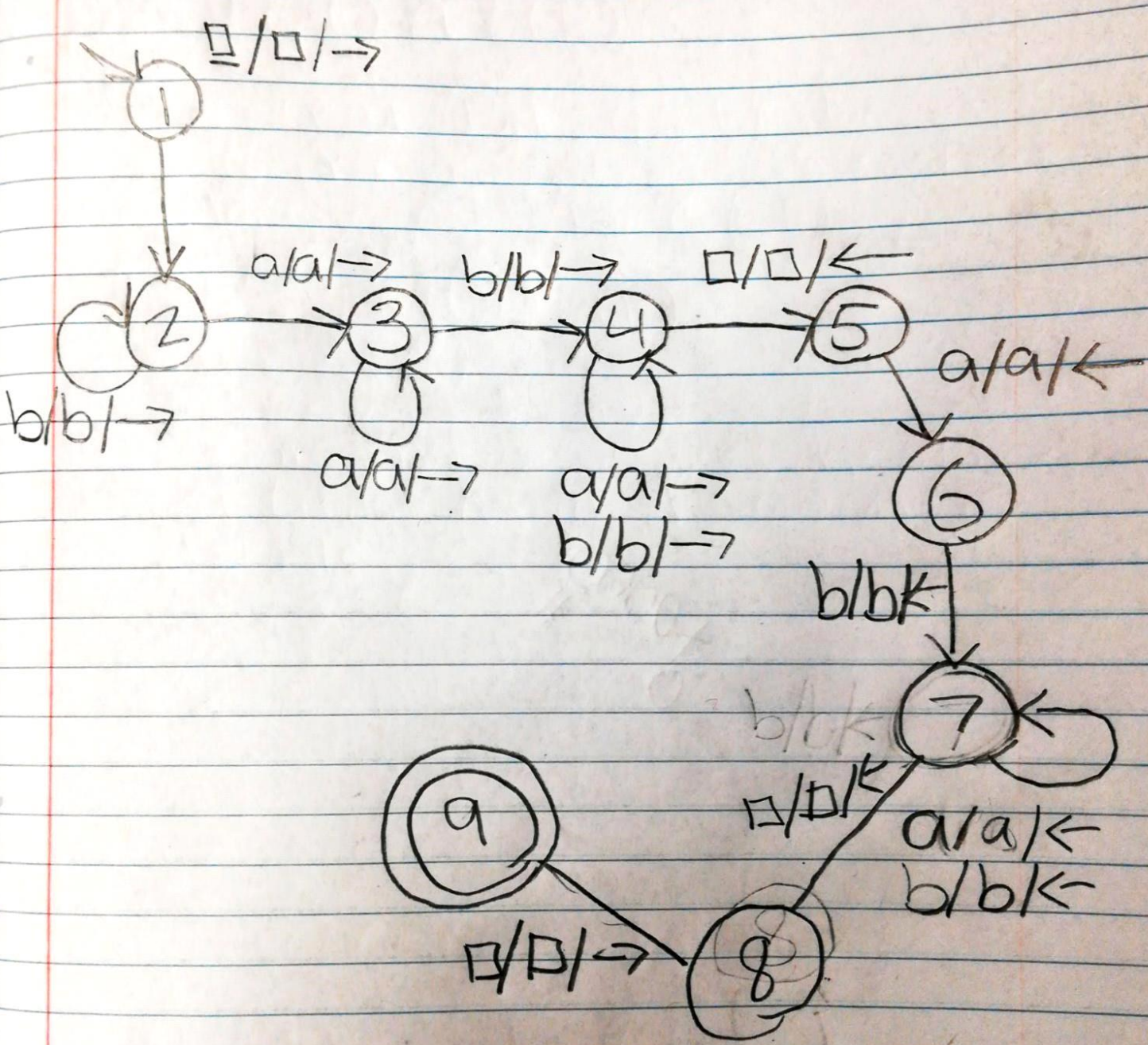
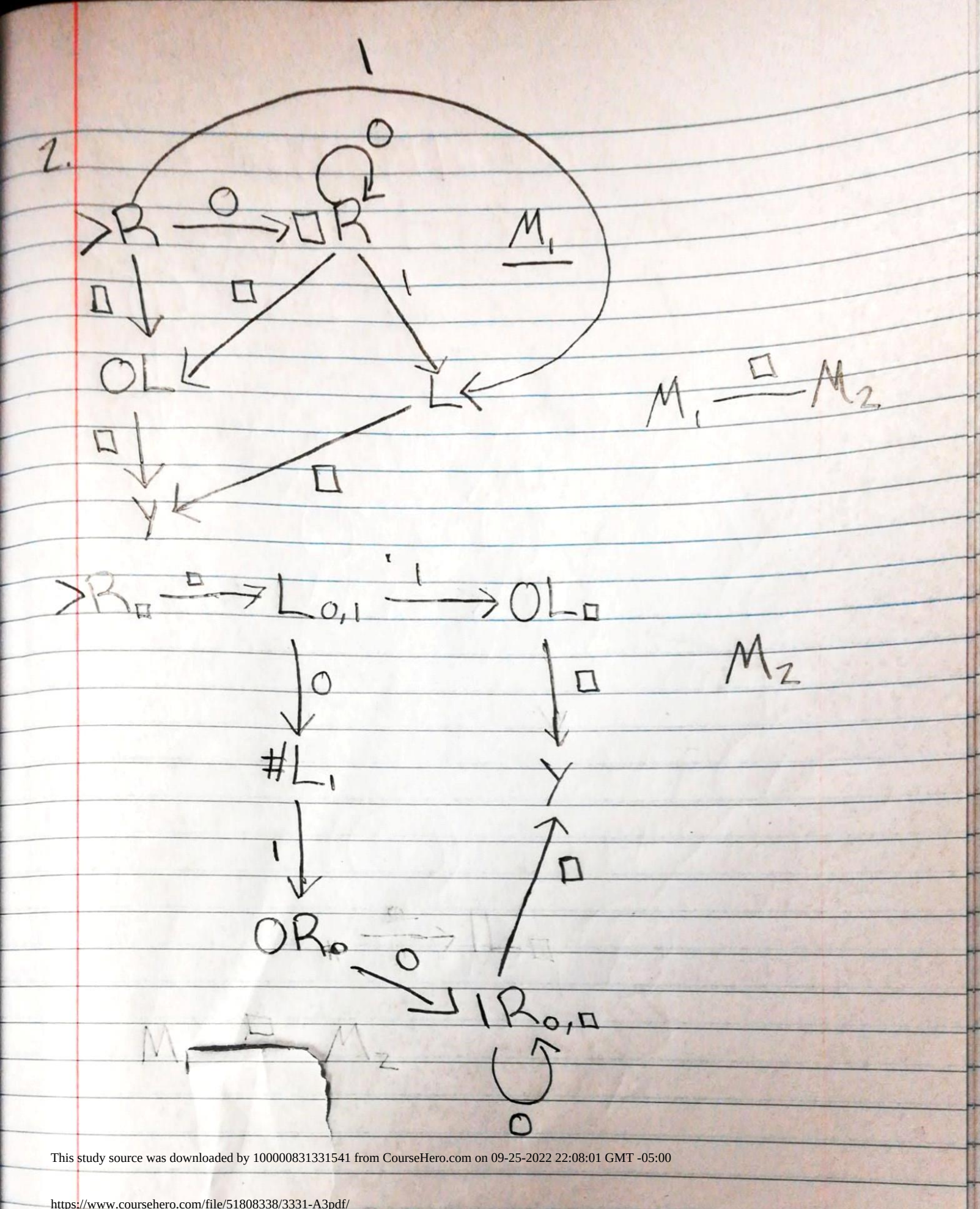
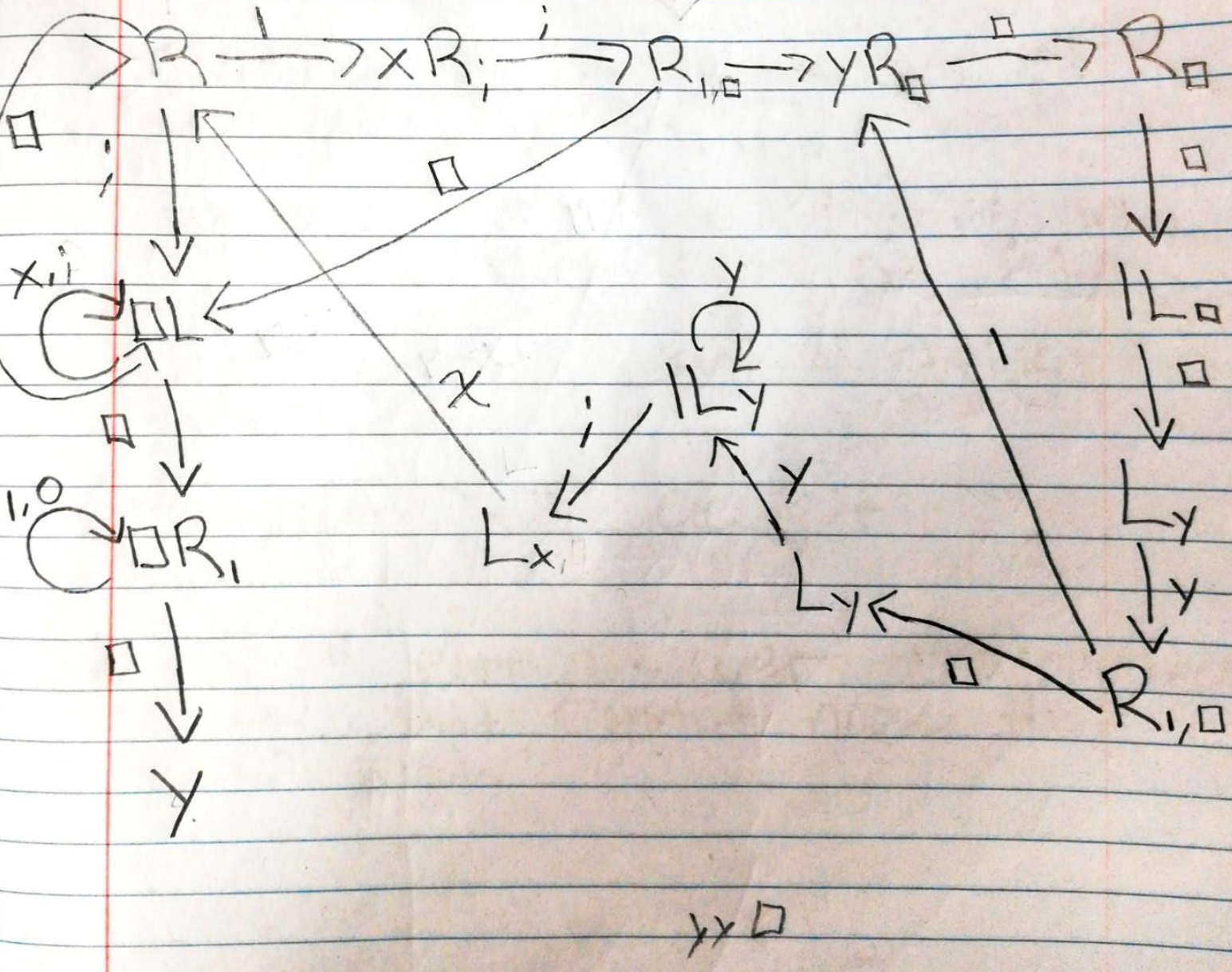
1. $L = \{w \in \{a,b\}^* \mid w$ has ab substr, end ba





3)



4. $L = \{\langle M \rangle \mid M \text{ accepts at least } 2 \text{ strings}\}$

construct a turing machine $M$ such that: $L(M) \subseteq \Sigma_M^*$

for each $\langle M \rangle$ take all strings in $\Sigma_M^*$ and run them on $M$,

if $M$ accepts, count # strings accepted.

if count $\geq 2$, accept

b) no, $M$ can discover 2 accepted strings, but cannot know that more exist.

$L = \{\langle M \rangle \mid M$ accepts binary encodings of the first 4 Fibonacci numbers $\}$

construct turing machine $M$ such that: $L(M) \subseteq \Sigma^*_M$

for each $\langle M \rangle$ run 1 on $M$, if accepts run 10 on $M$, if accepts run 11 on $M$ if accepts, accept, else loop

if for any of the above input $M$ fails to halt, halts and rejects, procedure will fail to halt.