CS 321, Assignment 5

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1

a

Step 1:
Adversary picks p
Step 2:
I select $w = (aa)^p(bbb)^p$, where $|w| \geq p$, and $w \in A$ and $w \in$ real numbers
Step 3:
Split into $w = xyz$ where $|xy| \leq p$, and $|y| > 0$
Step 4:
I pick $i = 0$, I win if $xy^iz \notin A$
Then $xy^0z = xz = (aa)^{p-|y|}(bbb)^0 \notin A$ since $|y| > 0$
The numbers of $num(aa, w) \neq num(bbb, w)$
I win, A is not regular.

b

Step 1:
Adversary picks p
Step 2:
I select $|w| = p^2$, where $|w| \geq p$, and $w \in A$ and $w \in$ real numbers
Step 3:
Split into $w = xyz$ where $|xy| \leq p$, and $|y| > 0$
Step 4:
I pick $i = p - 1$, I win if $xy^iz \notin A$
Then $xy^{p-1}z, |w| = (p + y^i) + (p - 1)p < (p + 1)^2 \notin A$ since $|y| > 0$
The length of w is not square
I win, A is not regular.

2

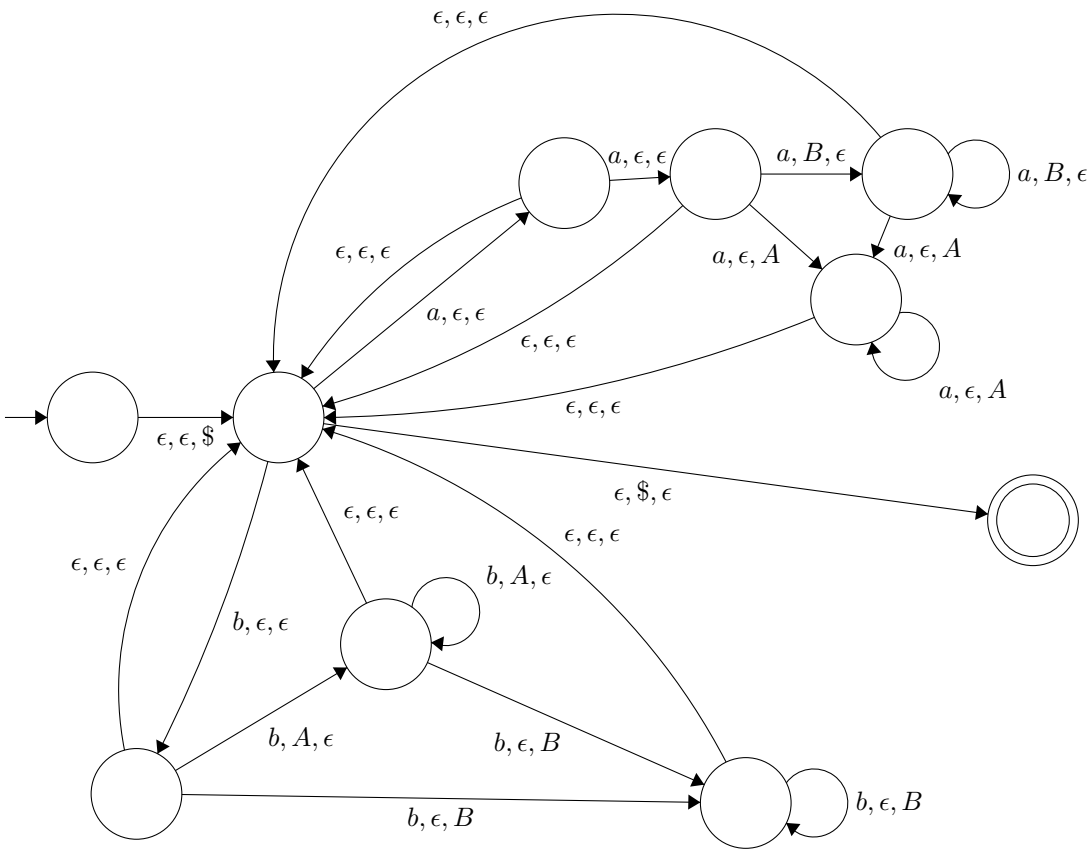
a

$S \to 1S0 \mid 0S1 \mid \epsilon$

b

$S \to aST \mid STa \mid aTS \mid TSa \mid aT \mid Ta \mid \epsilon$
$T \to bS \mid Sb \mid b$

3


ϵ, ϵ, ϵ
a, ϵ, ϵ
a, B, ϵ
a, B, ϵ
ϵ, ϵ, ϵ
a, ϵ, A
a, ϵ, A
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b, A, ϵ
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b, ϵ, B
b, ϵ, B
b, ϵ, B