

This quiz is

Question 1. Consider the alphabet $\Sigma = \{a, b\}$ and the language $L = \{a^n b^{2n} | n \geq 1\}$.

- (a) [1 1/2 points] Give a low-level and full description of a standard Turing Machine for the language L .

Basic idea: Match a's with two b's.

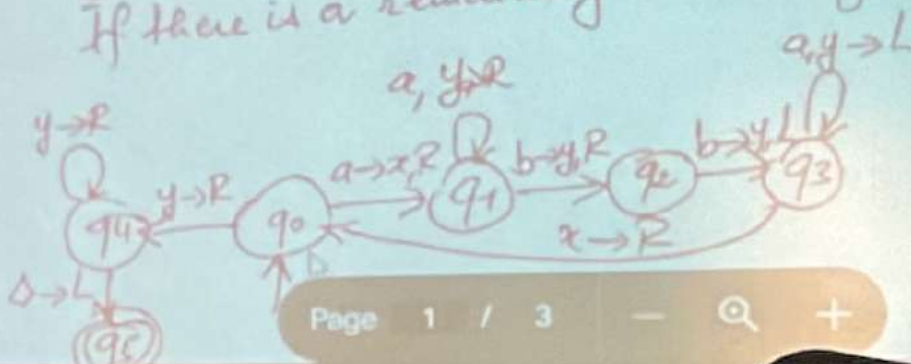
Repeat:

Replace leftmost a with x.

Find leftmost two b's and replace them with y's.

Until there are no a's or b's

If there is a remaining a or b reject.



Question 2.....
Consider the following context-free grammar. The alphabet $\Sigma = \{a, b\}$.

$R \rightarrow XRX|S$

$S \rightarrow aTb|bTa$

$T \rightarrow XTX|X|\epsilon$

$X \rightarrow a|b$

Answer the following questions by circling the correct answer: TRUE or FALSE.

- (a) [1/2 point] TRUE or FALSE: $T \Rightarrow aba$.
- (b) [1/2 point] TRUE or FALSE: $T \Rightarrow^* aba$.
- (c) [1/2 point] TRUE or FALSE: $T \Rightarrow T$.
- (d) [1/2 point] TRUE or FALSE: $T \Rightarrow^* T$.
- (e) [1/2 point] TRUE or FALSE: $XXX \Rightarrow^* aba$.
- (f) [1/2 point] TRUE or FALSE: $X \Rightarrow^* aba$.
- (g) [1/2 point] TRUE or FALSE: $T \Rightarrow^* XX$.
- (h) [1/2 point] TRUE or FALSE: $T \Rightarrow^* XXX$.
- (i) [1/2 point] TRUE or FALSE: $X \Rightarrow \epsilon$.
- (j) [1/2 point] TRUE or FALSE: $S \Rightarrow^* \epsilon$.