Florida Polytechnic University

COP 4020 Assignment #5

Due Date: Saturday, April 09, 2022, by 11:59 pm. In your assignment, please be sure to explain all mentioned points CLEARLY. ***Submit your assignment in electronic format (scan it if hard to write on computer and submit only on canvas, do not email me).***

Total Points of Assignment = 68

Q1) (Total 15 Points)

Use the pumping lemma to show that this language is nonregular:

$\{a^n b^n a^n\}$ = {aba aabbaa aaabbbaaa aaaabbbbaaaa…….} **(5 Points)**

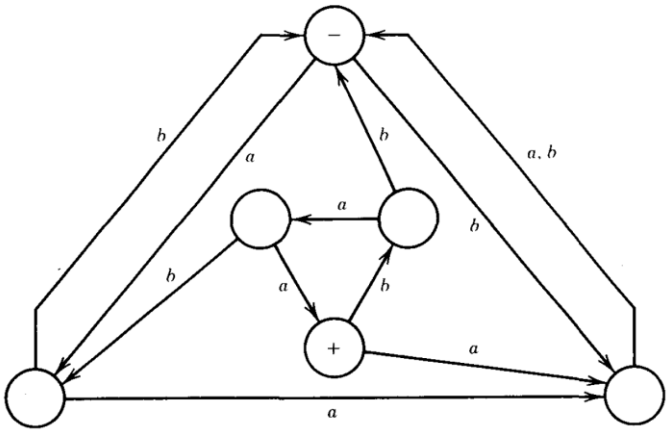
$\{ a^n b a^n \}$ = {aba aabaa aaabaaa……} **(5 Points)**

$\{ a^n b^{2n} \}$ = {abb aabbbb aaabbbbbb ……} **(5 Points)**

Q2) (Total 10 Points)

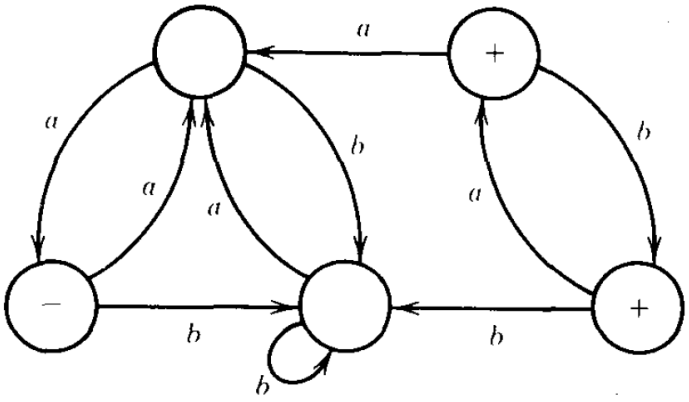
By using blue paint, determine which of the following FA's accept any words:

a)



(5 Points)

b)



(5 Points)

Q3) (Total 18 Points)

Describe the language generated by the following context free grammar (CFG) in English and write regular expressions:

a)

S → SS
S → ZZZ
Z → bZ
Z → Zb
Z → a **(3,3 Points)**

b) $S \rightarrow aS$
$S \rightarrow bb$ **(3,3 Points)**

c) $S \rightarrow XYX$
$X \rightarrow aX$
$X \rightarrow bX$
$X \rightarrow \Lambda$
$Y \rightarrow bbb$ **(3,3 Points)**

Q4) (Total 15 Points)

Find CFG for the following languages over the alphabet $\sum = \{a, b\}$:

a) All words that have different first and last letters. **(5 Points)**

b) All words in which the letter b is never tripled. **(5 Points)**

c) All words that do not have substring ab. **(5 Points)**

Q5) (Total 10 Points)

Show that the CFG below is ambiguous by finding a word with two distinct syntax trees. Show both syntax trees.

a) $S \rightarrow Sbb$
$S \rightarrow Sbbb$
$S \rightarrow b$ **(5 Points)**

b) $S \rightarrow AA$
$A \rightarrow AAA|a|bA|Ab$ **(5 Points)**

Wish You Best of Luck