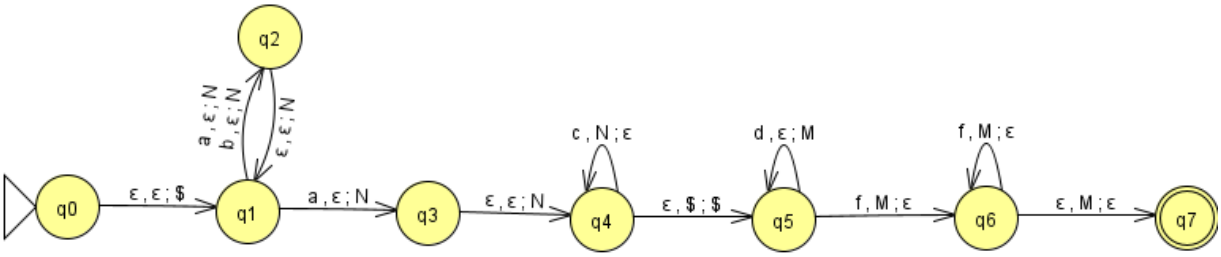
CS 361
Homework 6
FA 2025
Possible Points: 90
PDAs and CFGs

Name:



PDA A

1. (5 pts) Give the formal trace (include *all* paths) of the string “baccddf” through PDA A.

2. (5 pts) Give the set notation for PDA A

3. (10 pts) Draw the state machine (PDA) for the following language
   B = {w over {a,b,c} | $a^n bc^{n+2}$, n≥ 0}

4. (20 pts) Draw the state machine (PDA) for the following language
   C = {w over {a,b} | |w| > 0, w has more a’s than b’s, and w has an even number of a’s}

Grammar C	
S → aSb | dAd	Rule 1 | Rule 2
A → fgA | BD	Rule 3 | Rule 4
B → Bbc | ϵ	Rule 5 | Rule 6
D → hDh | hhD | k	Rule 7 | Rule 8

5. (5 pts) Derive the *shortest string* of the language for Grammar C. (Show every step of the derivation and justify each step with a rule.)

6. (5 pts) Derive a string that applies every rule of grammar C at least once. (Show every step of the derivation and justify each step with a rule.)

7. (5 pts) Is grammar C ambiguous? If yes, prove this by showing two parse trees for the same string. If no, explain your intuition (not a proof).

8. (10 pts) Design the CFG for the language of PDA A.

9. (10 pts) Design the CFG for language B

10. (15 pts) Give a set notation for the language of grammar C.