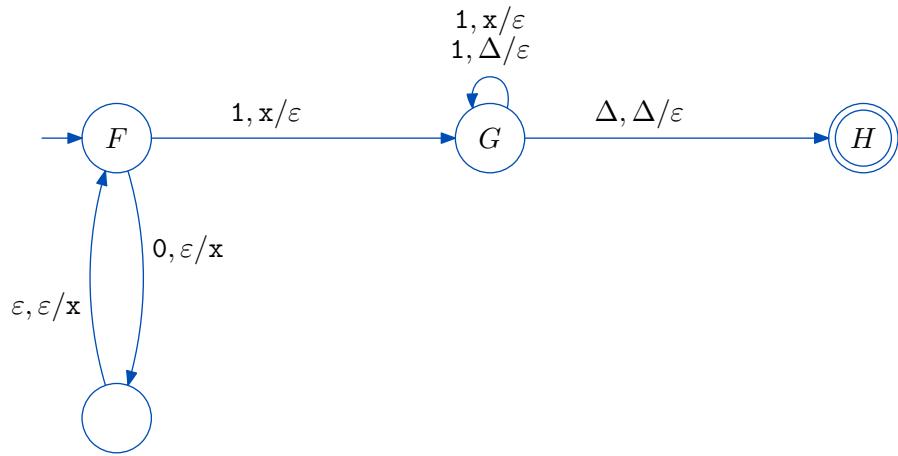


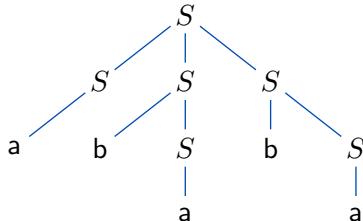
Some Answers on: Grammars and PDAs

C1: (a) $S \rightarrow 0S11 \mid S1 \mid \varepsilon$
 (b)



C2: $S \rightarrow XY$
 $X \rightarrow 0X1 \mid \varepsilon$
 $Y \rightarrow 1Y2 \mid \varepsilon$

C3: (a)

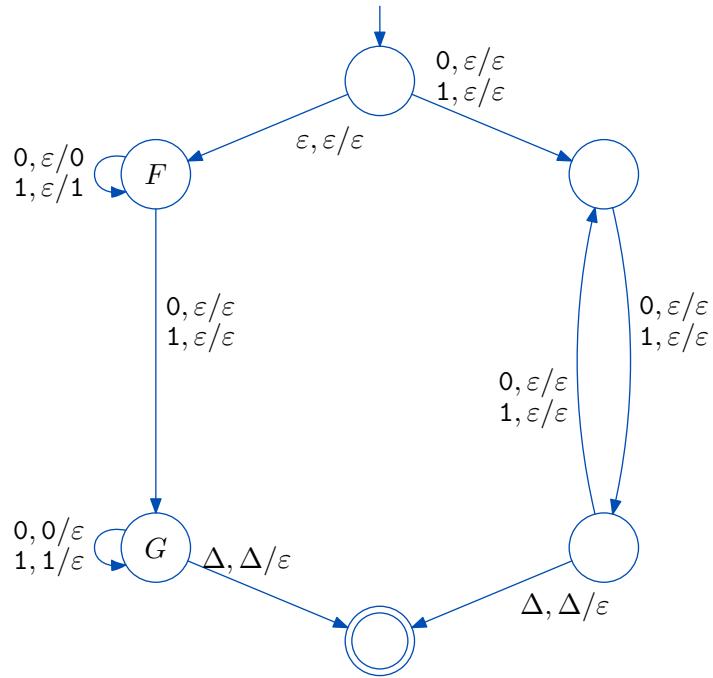


(b) All strings of a's and b's ending in a and having an odd number of a's.

C4: (a)

$S \rightarrow X \mid Y$
 $X \rightarrow 00X \mid 01X \mid 10X \mid 11X \mid 00 \mid 01 \mid 10 \mid 11$
 $Y \rightarrow 0Y0 \mid 1Y1 \mid 1 \mid 0$

(b)



C5: Balanced brackets/parentheses where both left brackets are considered the same and both right brackets are considered the same

C6: (a) 01010

(b) 0110110 or any string starting 01010

(c) All strings that contain two equal-length blocks of 1s surrounded by 0s.

C7: (a) 0000

(b) 0011

(c) Binary strings of even length with first and last bit the same.