COS 210

Worksheet 9

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**Question 1**

Q = {q}

Σ = {a,b,c}

Γ = {S,A,B,C}

And R being:

q0S → qNAB

q□S → qNε

q0A → qNAB

q0A → qNCB

q0A → qRε

q0B → qNAB

q0B → qRε

q0C → qNAC

q0C → qRε

## Question 2

q00$ → q0R$S, push S onto the stack

q00S → q0RSS, push S onto the stack

q01$ → q0N$, first symbol is a 1, loop forever

q01S → q0Rε, first 1 is read, pop S and move right

q0□ $ → q0Nε, string is empty, accept string

q0□ S → q0NS, string only contains 0's, loop forever

q10$ → q1N$, 0 appears to the right of 1, loop forever

q10S → q1NS, o appears to the right of 1, loop forever

q11$ → q1N$, more than 2x 1's than 0's, loop forever

q11S → q1R$, pop S off the stack and move right

q1□$ → q1Nε, accept

q1□S →q1NS, too many 0's, loop forever