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Q2. 48

$\Sigma = \{0,1\}$

C_1 has 1 in the middle third

C_2 has 2 1's in the middle third

$C_1 = \{xyz \mid xz \in \Sigma^* \text{ and } y \in \Sigma^* 1 \Sigma^*, \text{ where } |x| = |z| \geq |y|\}$

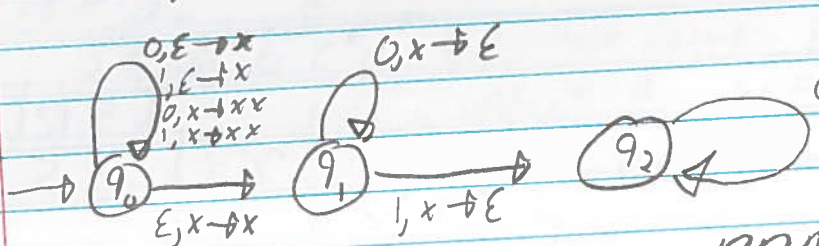
$C_2 = \{xyz \mid xz \in \Sigma^* \text{ and } y \in \Sigma^* 1 \Sigma^* 1 \Sigma^*, \text{ where } |x| = |z| \geq |y|\}$

a, show C_1 is a CFL

create a PDA

$M = (Q, \Sigma, \Gamma, \delta, q_0, F)$

$Q = \{q_0, q_1, q_2\}$, $\Sigma = 0,1$, $\Gamma = x$, $F = \{q_2\}$



Since we can create a PDA for C_1

C_1 is CFL