Mehmet INCE 31-10-18 HW-1

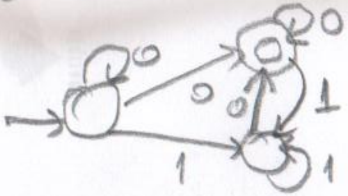
1.70 A avoids $B = \{w \mid w \in A$ and w doesn't contain any string B as a substring$\}$

namely A/B means

$A - (A \cap B) = (A - (A \cap (\Sigma^* B \Sigma^*)))$

since regular languages are closed under intersection and subtraction so it is under avoid operations.

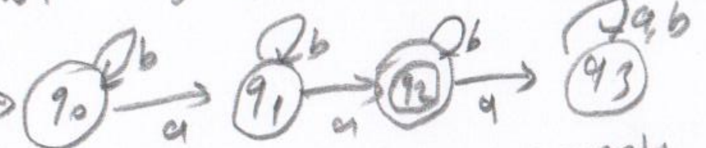
1.7e. $0^*1^*0^+$ with three states



1.5g $L = \{w \mid w$ is any string that doesn't contain exactly two a's$\}$

$\bar{L} = \{w \mid w$ is any string that contains exactly two a's$\}$

$\bar{L}$ = start



accept → reject and rejects → accepts

$L =$

1.29 $A_2 = \{www \mid w \in \{a,b\}^*\}$

→ Assume that A_2 is regular lang
→ A_2 must have pumping length (p)
→ split 3 parts xyz

1) $xy^iz \in A_2$ foreach $i \geq 0$
2) $|y| > 0$
3) $|xy| \leq p$

take an example string with p

$s = a^pba^pba^pb$

$p = j + k + m$

$x = a^j$ for $j \geq 0$

$y = a^k$ $k \geq 1$

$z = a^m ba^pba^pb$ $m \geq 0$

So xy^2z should be in A_2 $= \underline{a^j a^k} a^k \underline{a^m} ba^pba^pb$

$= a^{p+k}ba^pba^pb$ $xy^2z \notin A_2$ because $k \geq 1$ and this is a contradiction. A_2 is non-regular

1.18

a. $1\Sigma^*0$

b. $\Sigma^*1\Sigma^*1\Sigma^*1\Sigma^*$

c. $\Sigma^*0101\Sigma^*$

d. $\Sigma\Sigma0\Sigma^*$

e. $(0(\Sigma\Sigma)^*) \cup (1\Sigma(\Sigma\Sigma)^*)$

f. $(0 \cup 10)^* 1^*$

g. $\Sigma\Sigma\Sigma\Sigma\Sigma \cup \Sigma\Sigma\Sigma\Sigma \cup \Sigma\Sigma\Sigma \cup \Sigma\Sigma \cup \Sigma \cup \varepsilon$

h. $\varepsilon \cup 1 \cup 0 \cup 1(0 \cup 11(0 \cup 1))(0 \cup 1)^*$

i. $(1\Sigma)^*$

j. $000^* \cup (000^*1 \cup 100 \cup 010)0^*$

k. $\varepsilon \cup 0$

l. $(1^*01^*01^*)^*$

m. $\emptyset$ or $1[01]^*$

n. Σ^+