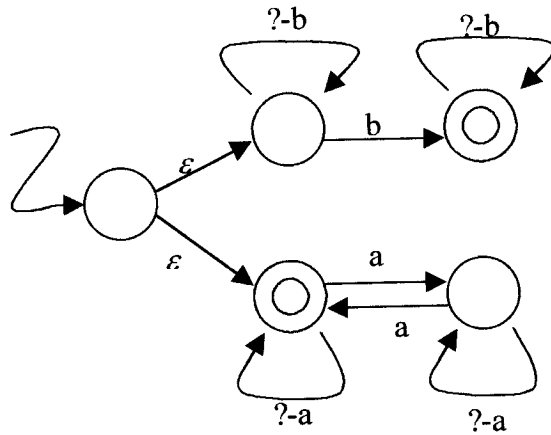# פתרון בוחן 1

שאלה 1

א. האוטומט (הלא דטרמיניסטי) הבא מקבל את L:

ב.

read regex [a a]*/[? - a] | b/[? - b];

שאלה 2

נעזר בטבלת ההמרה הבאה:

l	ל		a	א	
m	מ		b	ב	
n	נ		g	ג	
s	ס		d	ד	
y	ע		h	ה	
p	פ		v	ו	
q	צ		z	ז	
k	ק		x	ח	
r	ר		f	ט	
w	ש		i	י	
t	ת		c	כ	

define NotPeyNun [a | h | x | r | y];
define PeyNun [b | c | d | f | g | i | k | l | m | n | p | q | s | t | v | w | z];
define letter NotPeyNun | PeyNun;
define Pattern m letter^3;
define Exceptions i -> v || .#. m _ ,, n -> 0 || .#. m _ PeyNun;
read regex [Pattern .o. Exceptions] | [~Pattern .x. error];

$\forall w \in \Sigma^* \quad A \ .o. \ B \ (w) = A(w) \cap B$.

B is a constraint allowing a string in the upper language of A to be mapped only to strings, which satisfy the constraint (i.e., belong to B). Notice that the set of outputs for a string after the composition might be empty if no output satisfies the constraint.

In the example: A is the relation which maps an a to an even number of b's and a b to two b's. B is a constraint, which require the result to be a string of b's divisible by 3.

A .o. B for A, B above result with the relation which maps an a to a string of b's divisible by 6 (the smallest number which is divisible both by 2 and 3), but for a b there is no map since [b b] can not satisfy the constraint. Formally:

A .o. B (b)=[b b] $\cap$ [b b b]* = ϕ

A .o. B (a)=[b b]* $\cap$ [b b b]* = [b b b b b b]*

ב.

A .$\oplus$. B will map every sting in the upper language of A to the string in its lower language that satisfies the constraint (i.e., belong to B), except for those elements that are not mapped to anything, and they will regain their previous outputs. The new operator enforces the constraint only to those strings in the upper language of A which have an output that satisfies the constraint.

In the example: A .$\oplus$. B will map an a to a string of b's divisible by 6 (the smallest number which is divisible both by 2 and 3) as before, and a b to two b's (since the constraint can not be satisfied for any map of the input b).

ג. בהינתן A ו- B נגדיר:

define comp A .o. B;

define A .$\oplus$. B comp | [~[comp.u] .o. A];