

Homework #8

Question 1

Describe a TM M in both graphical and compositional tabular forms that *decides* the language $L = \{u \in \Sigma_0^* \mid u = u^R\}$

(Hint : you may use an extra symbol $\$ \notin \Sigma_0$ and choose as initial ID : $(s, \#u)$)

Question 2

Describe a TM M in both graphical and compositional tabular forms that performs the following computation :

$(s, \$w\#) \vdash^{*_M} (h, \$u\#)$

where u is obtained from w by compressing all blank ($\#$) symbols in w and $\$$ is a special symbol not used in w .

Question 3

Construct a TM M (*multitape and/or nondeterministic if necessary!*) that decides the language below (specify the TM in tabular compositional form).

$L_n = \{\omega \in (0+1)^* \mid \omega = u.u.u, u \in (0+1)^*\}$

Question 4

Construct a TM M (*multitape and/or nondeterministic if necessary!*) that decides the language below (specify the TM in tabular compositional form).

$L_n = \{\omega \in (a+b+c+d)^* \mid \omega = a^n b^m c^n d^m, n, m > 0\}$

Question 5

Construct TMs in compositional tabular forms (*multitape and/or nondeterministic if necessary!*) that perform the following computations :

(i) $(s, \#w) \vdash^{*_M} (h, \#w^R)$

(ii) $(s, \#w) \vdash^{*_M} (h, \#ww)$

(iii) $(s, \#w) \vdash^{*_M} (h, \#w\#w^R)$

(iv) $(s, \#w) \vdash^{*_M} (h, \#a^n b^n)$ where the number of a s and b s in w are both equal to a fixed integer $n > 0$.