Question 1

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

(s, \$w#) |---*$_M$ (h, \$u#)

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

Question 2

Construct a *TM M* (***multitape*** and/or ***nondeterministic*** if necessary!) that decides the language $L*$ using a *TM M_1* that decides the language L .

Question 3

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

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

Question 4

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

 (i) (s, #w) |---*$_M$ (h, #w^R)

(ii) (s, #w) |---*$_M$ (h, #ww)

(iii) (s, #w) |---*$_M$ (h, #w#w^R)

(iv) (s, #w) |---*$_M$ (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*.