

## **Homework #8** due January 2 before recitation

### **Question 1**

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 (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  $M_I$  that decides the language  $L$ .

### **Question 3**

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

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

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

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

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