Universität Erlangen-Nürnberg Department of Computer Science 7 Dr.-Ing. U. Klehmet Introduction to Data Structures and Algorithms

Exercise sheet 9

Exercise 26:

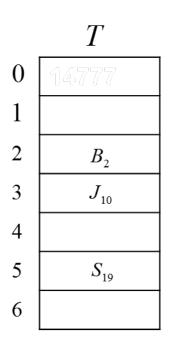
The keys 89, 4, 36, 42, 51, 77, 5, 19 are inserted in that order into a hash table with 7 slots. The hash function used is $h(k) = k \mod 7$. Show the final picture ! Are there collisions and if so, where?

Exercise 27:

Take letters of Latin alphabet as keys with subscripts such as A_1, B_2, C_3, R_{18} and Z_{26} where the subscripts mark

- the letter's position in alphabetical order, e.g. S_{19} for letter 'S' as the 19th letter in the Latin alphabet
- hash-table T contains space for 7 entries, numbered from 0 to 6
- in the table the keys B_2, J_{10} and S_{19} are already inserted

Insert N_{14}, X_{24} , and W_{23} into the table T by algorithm HASH-INSERT with **Linear probing**. The auxiliary hash function $h': U \rightarrow \{0,1,...,m-1\}$ is defined by the Division method, where *k* in h'(k) should be the subscript number of the letter.



Exercise 28:

We have a hash table T of size m = 13 with the keys 79, 13, 69, 98, 72, and 50 already present in the corresponding table positions T[1], T[2] etc.

Insert the key 14 and then key 15 into the table T by use of algorithm HASH-INSERT with the open addressing method **Double hashing**. The auxiliary hash functions h_1 and h_2 are defined

as follows: $h_1(k) = k \mod 13$ and $h_2(k) = 1 + (k \mod 11)$

	T
0	
1	79
2	13
3	
4 5	69
5	98
6	
7	72
8	
9 0	
0	
1	50
2	

1 1 1