# CSE 373 - Data Structures Homework 4 

Assigned: Wednesday, April 24, 2002<br>Due: Wednesday, May 1, 2002<br>At the start of class

Remember:
Attach a copy of your turnin receipt
Do a web turnin of hash.c and symbol_hash.c
Do a web turnin of hashtv.txt, hashpid.txt, hashbin.txt, and hashperfect.txt

Your name:

Student number:

1. Consider the output file hashperfect.txt, produced using symbols in perfectsymbols.txt.
a. Briefly explain how your function hashPerfect works. Does it map all the Symbols in perfectsymbols.txt to different index values?
b. Draw a diagram of what the hash table in test 7 (created using your hashPerfect) looks like after the first Symbol (1111 op120) has been inserted in the table. The table has been created with 101 slots, and one Symbol has been inserted using hashPerfect. Start with the HeaderTable pointer and show the HeaderTbl struct, the array of list pointers, the header nodes, the list nodes, the element pointers, the Symbol struct, and the name string (containing "op120"). You can use "..." notation to avoid drawing the many repeated headers for empty lists, just show the first empty list header and the last empty list header and indicate that there are many missing in between.
2. Consider the output file hashtv.txt, produced using the symbols in tvsymbols.txt
a. The first hash table (test 0 ) was built using the hashConstant function. The maximum length list is shown as having 19 elements, the same as the total number of elements in the table. Which of the 100 slots in the table has this 19-element list (slots are numbered 0 to 99)? Explain your selection.
b. The last hash table (test 7) was built with the hashPerfect function, designed for use with perfectsymbols.txt. Did your function map all the symbols in tvsymbols.txt to unique hash codes? If not, explain why the symbols in the longest list were all mapped to the same index by your hashPerfect function.
3. Consider the output file hashpid.txt, produced using the symbols in pidsymbols.txt.
a. Which of the tests produced the shortest maximum list length?
b. What were the hash function and table size used for this test?
4. Consider the output file hashbin.txt, produced using the symbols in binsymbols.txt.
a. In test 2 , the hash table is built using the character shift and add Hasher with 100 slots in the table. Although there are an average of about 15 entries expected in each list, there may be at least one list with many more that that. What is the longest list in this table?
b. Looking at the list of symbol names in the longest list (printed at the end of the test 2 section) explain why all the symbols in this list were hashed to the same index by your character shift and add Hash function.
c. Tests 5 and 6 in hashbin.txt use the character radix hasher to build the tables. What is the maximum list length in test 5 ? What is the maximum list length in test 6 ?
d. In general terms, explain why you think they are the same or why they are different.
