Problem Set 4: Q: 4.1

a) 1) Yes. The sum operation will space strings out by length

2) Yes. The sum operation will space strings out by contained characters

3) No as words' reordering in a string does not produce a different hash function

4) NO, because it violates the independence condition of the simple uniform hashing assumption

b) Statement 4 is correct. The dynamic resizing and collision are both neccessary for hash table. Without collision resolution, it could produce an actual hash function; however, no amount of resizing will be let into

the hash table. Without dynamic resizing, the load factor will get large, turning everything into a linear-time look up.

c) $O(m'+n)$.

- Take $O(m')$ time to create a new hash table
- $\Theta(m+n)$ time to go through each slot in the old table and copy each item

→ Take $\Theta(m'+m+n)$ } → Take $\Theta(m'+n)$

We have $m < m'$

d)

4.2) a) Statement 1 is correct

b) Because highly sparse hash table is beneficial for unit test → growth factor = 4

Also, lots of things will be inserted front

→ Larger minimum size is better

→ I choose statement 4.