Suppose you are implementing a hash table and are trying to choose between using a probing strategy and using

chaining (each slot is actually a linked list that can hold as many records as needed). You will use the same hash

function and hash table size no matter which strategy you select.

a) [10 points] A primary collision occurs when two records map to the same home slot in the table. Will the number

of primary collisions be lower if you choose probing or if you choose chaining? Justify your conclusion carefully.

The home slot of a record depends only on the key, the hash function, and the size of

the

table. The collision resolution strategy does not come into play in selecting the home slot.

Therefore the number of primary collisions will be same no matter what collision resolution

strategy is used.

b) [10 points] One objection to using chaining is that you'll have to perform a linear traversal of the linked list to find

a record, and linear traversals are slow. Considering that, and assuming that a small but significant number of

primary collisions will occur, would

searching be more efficient if you chose linear probing instead of chaining?

Justify your conclusion carefully.

In short, no. Using linear probing cannot require fewer steps than chaining.

When chaining is used, the only records that need to be traversed are those that actually

collided in the slot in question.

When linear probing is used, elements that hash to different home slots can collide as probing is

performed. If that occurs, then searching for those elements will require looking at more

elements than if chaining were used. In the best case, the number of elements we encounter

will be the same as when chaining were used.

c) [10 points] Reconsider part b under the assumption that you'd choose quadratic probing as an alternative to

chaining.

Quadratic probing will decrease the probability that "secondary" collisions will occur during

probing, since elements that hash to adjacent slots will (for the most part) probe to a different

sequence of slots.

But there is still a chance of "secondary" collisions with quadratic probing. So, the conclusion is

essentially the same.