# Assignment 3.1

Given the list of numbers as follow: 74, 12, 217, 36, 61, 77, 286, 153, 337, 93, 121, 47, 463, 248 and

146. You are asked to put those numbers into a hash table of 23 slots (m = 23), using the hash function

as follows: h1(k) = k mod m.

Collision resolution:

1. Chaining using a linked list.

2. Linear probing.

3. Quadratic probling.

4. Double hashing: h2(k) = (k mod (m-1)) + 1 à h(k,i) = h1(k) + i \* h2(k)).

## Chaining using a linked list:

For chaining, we create a linked list for each slot in the hash table. Each number will be hashed using the hash function h1(k) = k mod m, and then inserted into the linked list at the corresponding slot.

Here is the hash table representation after inserting the given numbers:

Slot 0:

Slot 1: 93 -> 47

Slot 2:

Slot 3: 463

Slot 4:

Slot 5: 74

Slot 6: 121

Slot 7:

Slot 8: 77 -> 146

Slot 9:

Slot 10: 217 -> 286

Slot 11:

Slot 12: 12

Slot 13: 36

Slot 14:

Slot 15: 61 → 153 → 337

Slot 16:

Slot 17:

Slot 18: 248

Slot 19:

Slot 20:

Slot 21:

Slot 22:

## Linear probing:

For linear probing, if a collision occurs while inserting a number, we increment the index and check the next slot until an empty slot is found.

Here is the hash table representation after inserting the given numbers using linear probing:

Slot 0:

Slot 1: 93

Slot 2: 47

Slot 3: 463

Slot 4:

Slot 5: 74

Slot 6: 121

Slot 7:

Slot 8: 77

Slot 9: 146

Slot 10: 217

Slot 11: 286

Slot 12: 12

Slot 13: 36

Slot 14:

Slot 15: 61

Slot 16: 153

Slot 17: 337

Slot 18: 248

Slot 19:

Slot 20:

Slot 21:

Slot 22:

## Quadratic probing:

For quadratic probing, if a collision occurs while inserting a number, we use a quadratic function to probe the next slots until an empty slot is found.

Here is the hash table representation after inserting the given numbers using quadratic probing:

Slot 0:

Slot 1: 93

Slot 2: 47

Slot 3: 463

Slot 4:

Slot 5: 74

Slot 6: 121

Slot 7:

Slot 8: 77

Slot 9: 146

Slot 10: 217

Slot 11: 286

Slot 12: 12

Slot 13: 36

Slot 14:

Slot 15: 61

Slot 16: 153

Slot 17:

Slot 18: 248

Slot 19: 337

Slot 20:

Slot 21:

Slot 22:

## Double hashing:

For double hashing, we use two hash functions. The first function is h1(k) = k mod m, and the second function is h2(k) = (k mod (m-1)) + 1. We use the formula h(k, i) = h1(k) + i \* h2(k) to probe the next slots.

Here is the hash table representation after inserting the given numbers using double hashing:

Slot 0: 337

Slot 1: 93

Slot 2:

Slot 3: 463

Slot 4:

Slot 5: 74

Slot 6: 121

Slot 7: 146

Slot 8: 77

Slot 9: 47

Slot 10: 217

Slot 11: 286

Slot 12: 12

Slot 13: 36

Slot 14: 153

Slot 15: 61

Slot 16:

Slot 17:

Slot 18: 248

Slot 19:

Slot 20:

Slot 21:

Slot 22: