CIS 263

Array is following {4371, 1323, 6173, 4199, 4344, 9679, 1989}

Hash Function is $h(x) = x \bmod 10$

Seperate Chaining hash table

For each value find the index location

4371 mod 10 = 1

1323 mod 10 = 3

6173 mod 10 = 3

4199 mod 10 = 9

4344 mod 10 = 4

9679 mod 10 = 9

1989 mod 10 = 9

Seperate Chaining hash table

index	value stored
0	
1	4371
2	
3	[1323, 6173]
4	4344
5	
6	
7	
8	
9	[4199, 9679, 1989]

linear Probing Hash table

Using Same mod as the previous table

4371 mod 10 = 1 ✓
1323 mod 10 = 3 ✓
6173 mod 10 = 3 X +1 = 4 ✓
4199 mod 10 = 9 ✓
4344 mod 10 = 4 X +1 = 5 ✓
9679 mod 10 = 9 X +1 = 0 ✓
1989 mod 10 = 9 X +1 = 0 X +1 = 1 X +1 = 2 ✓

Linear Probing Hash Table

index	value stored
0	9679
1	4371
2	1989
3	1323
4	6173
5	4344
6	
7	
8	
9	4199

Quadratic probing hash table

$C_1 = 1 \quad C_2 = 2$

$h(k,i) = (h'(k) + C_1 i + C_2 i^2) \% m$

$(4371 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 1$ ✓
$(1323 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 3$ ✓
$(6173 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 3$ X
$(6173 + 1 \cdot 1 + 2 \cdot 1^2) \bmod 10 = 6$ ✓
$(4199 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 9$ ✓
$(4344 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 4$ ✓
$(9679 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 9$ X
$(9679 + 1 \cdot 1 + 2 \cdot 1^2) \bmod 10 = 2$ ✓
$(1989 + 1 \cdot 0 + 2 \cdot 0^2) \bmod 10 = 9$ X
$(1989 + 1 \cdot 1 + 2 \cdot 1^2) \bmod 10 = 2$ X
$(1989 + 1 \cdot 2 + 2 \cdot 2^2) \bmod 10 = 9$ X $\rightarrow (1989 + 1 \cdot 3 + 2 \cdot 3^2) \bmod 10 = 1$ X $\rightarrow i = 4 = 6 \rightarrow i = 5 = 5$

Quadratic Probing Hash Table

Index	Value Stored
0	
1	4371
2	9679
3	1323
4	4344
5	1989
6	6173
7	
8	
9	4199

double Hash table

Primary hash = $h(x) = x \bmod 10$

Secondary hash = $h_2(x) = 7 - (x \bmod 7)$

4371 mod 10 = 1 ✓

1323 mod 10 = 3 ✓

6173 mod 10 = 3 X

$h_1(x) = 3 + (7 - 6173 \bmod 7) = 4$ ✓

4199 mod 10 = 9 ✓

4344 mod 10 = 4 X

$h_1(x) = 4 + (7 - 4344 \bmod 7) = 7$ ✓

9679 mod 10 = 9 X

$h_1(x) = 9 + (7 - (9679 \bmod 7)) = 1$ X

$h_2(x) = 9 + 2 \cdot (7 - (9679 \bmod 7)) = 3$ X

$h_3(x) = 9 + 3 \cdot (7 - (9679 \bmod 7)) = 5$ ✓

$= 5$

1989

$h_4(x) = 9 + 4 \cdot (7 - (1989 \bmod 7)) = 7$ X

$h_5(x) = 9 + 5 \cdot (7 - (1989 \bmod 7)) = 9$ X

$h_6(x) = 9 + 6 \cdot (7 - (1989 \bmod 7)) = 1$ X

$h_7(x) = 9 + 7 \cdot (7 - (1989 \bmod 7)) = 3$ X

$h_8(x) = 9 + 8 \cdot (7 - (1989 \bmod 7)) = 5$ X

this begins to repeat? It will never find a location for the last one? I guess in that case it would just do +1?

double hash table	
index	Value stored
0	not sure. → 1989?
1	4371
2	
3	1323
4	6173
5	9679
6	
7	4344
8	
9	4199