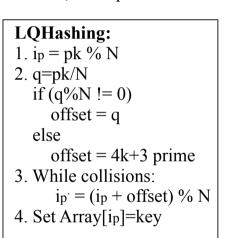
Hashing Lab

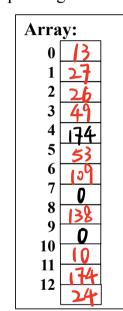
1. Given the following key values, show what the data structures would look like after insertions 27 53 13 10 138 109 49 174 26 24

(no preprocessing necessary: $p_k = key$)

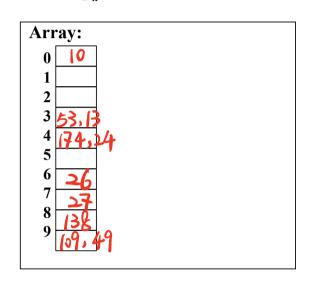
a. Linear array of 10 elements using division hashing and the linear-quotient collision path algorithm

$$N = 13, 4k+3 \text{ prime} = 19$$





Bucket hashing of 10 elements (N=10) $i_p = (p_k) \% N$



pk	îþ	9	offset 19% nj	Array Lip]
27	1)	2	AU] = 27
53	(1+4)1.13=5	4	4	There is will'sion ALS] = 53
13	O	Ö	Ö	A[0] = 13
(0	(0	O	0→4K+3	A[10] = 10
138	B	Lo	(0	AL&] = 138
109	(5+8)%13 = 0 (0+8)%13 = 8 (8+8)%13 = 3 (3+8)%13 = 4 (4+8)%13 = 6	8	8	There's collision There's collision There's collision There's collision There's collision ACGT = 109.
49	(10+3) % 13 = 0 (0+3) % 13 = 3	3	3	There is collision There is collision A Z37 = 49.
174	5 15+19/2-13=11	13	0->44+3=9.	There is willision A[11] = 174
26	6-12)%13=2	2	2	There is well is sion A[2] = 26.
24	11/11/1/13 = 12		(There is willision A[12]=24

PK	ip	q	offset (9% n)	Array [ip]
27	7	2	2	AL7] = 27
53	3	5	5	A[3] = 53
13	& (3H)\$10=4			Collision A[4] = 13.
()	0	0	0->46+3=19	A[0] = 10
138	8	13	3	A[&] = (3&
109	9	10	0->4K+3=19	AZ97 =69
49	9 (9+4) \$ 10=3 (3+4) \$ 10=7 (7+4) \$ = 1	4	4	Collision Collision Collision A[1] = 49.
174	4 (4+7)%10=1 (4+7)%10=8 (8+7)%10=6	17	7	Collision Collision Collision ALS] = 174
26	6	<u>)</u>	2	A[6] = 26
24	4 (4+2)%10=b (b+2)%10=8 (8+2)%10=0 (0+2)%10=2	2	<u>)</u>	Collision Collision Collision Collision [2] = 24

2. Fill in the table based on exercise 1

Number of comparisons to retrieve this element

Key	Linear array - (Length of Collision Path +1)	Buckets - (# of elements in linked list compared)
53	1+1=2	
138	0H=1	
109	5+1=6	(
49	2+1=3	2
174	1+1=2	(
26	141=2	(