CSC 323 Algorithm Design and Analysis, Spring 2016
Instructor: Dr. Natarajan Meghanathan

Quiz 5 (March 8, 2016)   Max. Points: 25   Max. Time: 15 min.
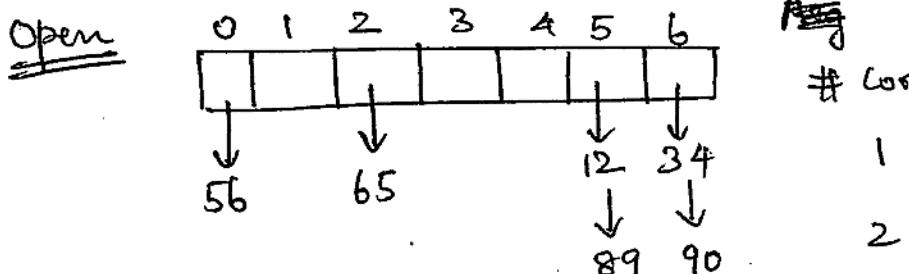
1) (13 pts) Construct a <u>open hash table</u> and <u>closed hash table</u> of the array: **56   34   12   89   65   90**. Use the hash function $H(K) = K \mod 7$.
Determine the <u>average number of comparisons</u> for a successful search in <u>each of the two hash tables</u>.
Show all the work.

56   34   12   89   65   90

$H(k)$ 0   6   5   5   2   6

Open

Comparisons
1
2

Avg # Comparisons

$$! = \frac{(1)(4) + (2)(2)}{6}$$

$$= \frac{8}{6} = 1.33$$

Closed

0	1	2	3	4	5	6
56	89	65	90		12	34

Comparisons

56 — 1
34 — 1
12 — 1
89 — 4
65 — 1
90 — 5

Avg # Comparisons

$$= \frac{(1 \times 4) + (4 \times 1) + (5 \times 1)}{6}$$

$$= \frac{13}{6} = 2.16$$

2) (12 pts) Construct a heap for the array **56 34 12 89 65 90** using the bottom-up approach. Also, show the step-by-step sorting of the array based on the heap constructed. Show all the work.
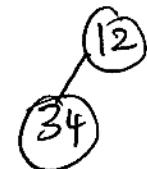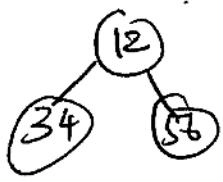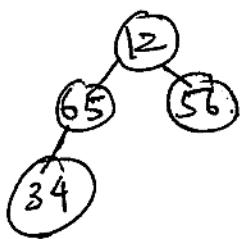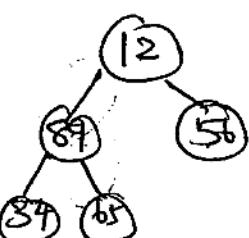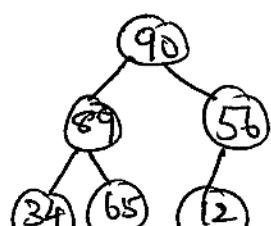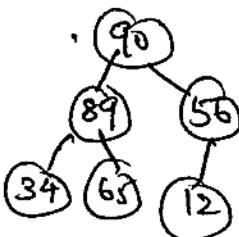
0	1	2	3	4	5	6
	90	89	56	34	65	12

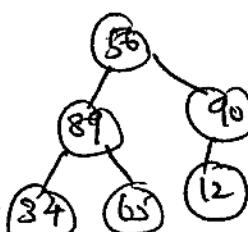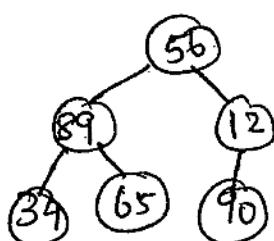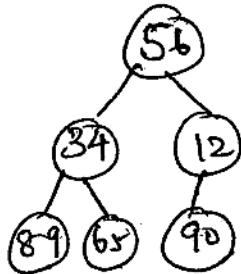| 0	1	2	3	4	5	6
	12	89	56	34	65	90

0	1	2	3	4	5	6
	89	65	56	34	12	90

0	1	2	3	4	5	6
	12	65	56	34	89	90

0	1	2	3	4	5	6
	65	34	56	12	89	90

0	1	2	3	4	5	6
	12	34	56	65	89	90

0	1	2	3	4	5	6
	56	34	12	65	89	90

0	1	2	3	4	5	6
	12	34	56	65	89	90

0	1	2	3	4	5	6
	34	12	56	65	89	90

0	1	2	3	4	5	6
0	12	34	56	65	89	90

sorted array

2