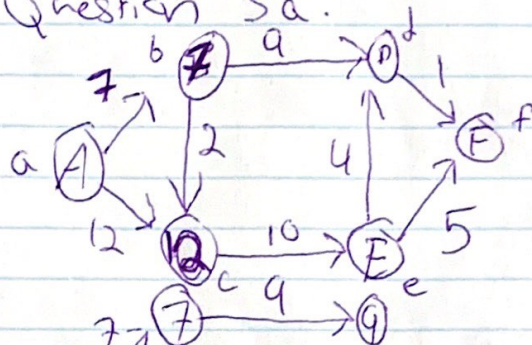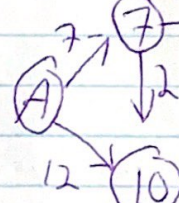Question 3a:

Add A to x
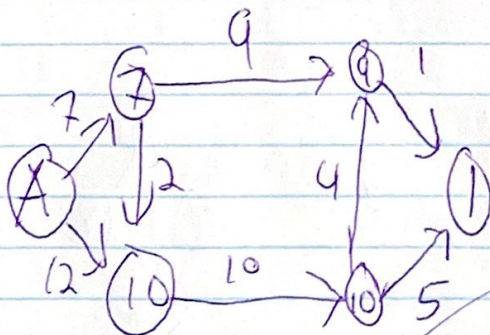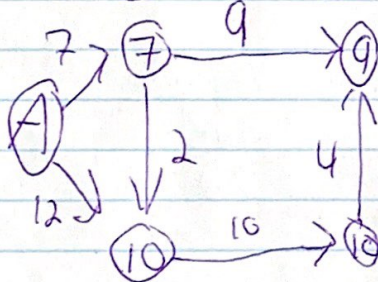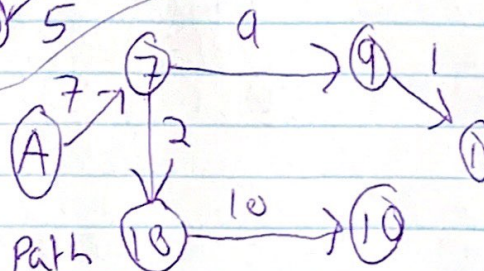
Add b to x

Add c to x

Add e to x

Add d to x

Shortest Path

Question B:

Question C: Shortest path to F is 3

Question 4:

Step:

1. ①

2. ①
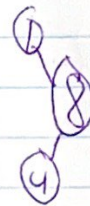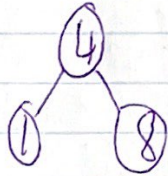   └ ⑧

   ①
   └ ⑧
     └ ④

3. Balance RL Rotation:

   ④
   ├ ① └ ⑧
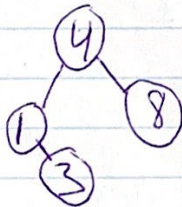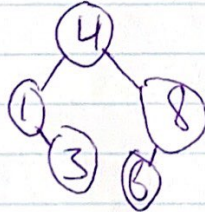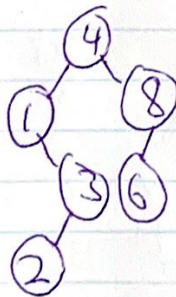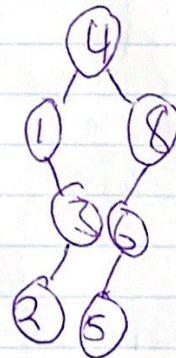
4. ④
   ├ ①   └ ⑧
     └ ③

5. ④
   ├ ①   └ ⑧
     └ ③   ⑥

6. ④
   ├ ①   └ ⑧
     └ ③ ⑥
       └ ②

7. ④
   ├ ①   └ ⑧
     └ ③ ⑥
       ② ⑤

Question 5:

Step 1:

Insert (4)

Insert (3)

2:

Insert (8)

3:

Insert (2)

4:

Insert (7)

5:

6:

Insert (1)

7:

Insert (6)

8:

Insert (2)
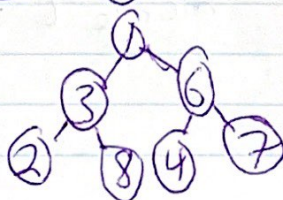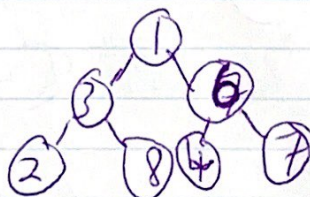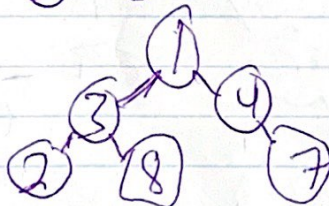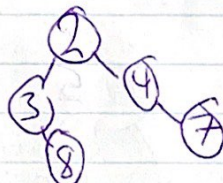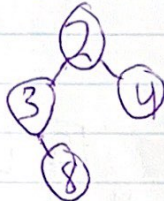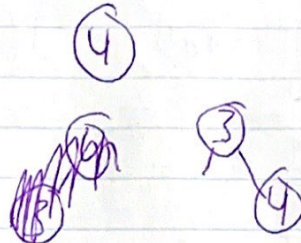
Question 6: N = 11

k	$h(k) = k \bmod 11$	$f(k) = 5 - k \bmod 5$	Probes
9	2	1	2
20	9	5	9
7	4	3	4
18	7	2	7
31	9	4	9, 13
29	7	1	7, 8
5	6	5	6
16	5	4	5, 11

0	9	31	7		5	18	29	20		16
0	1	2	3	4	5	6	7	8	9	10

Question 7:

merge a

merge f

merge C
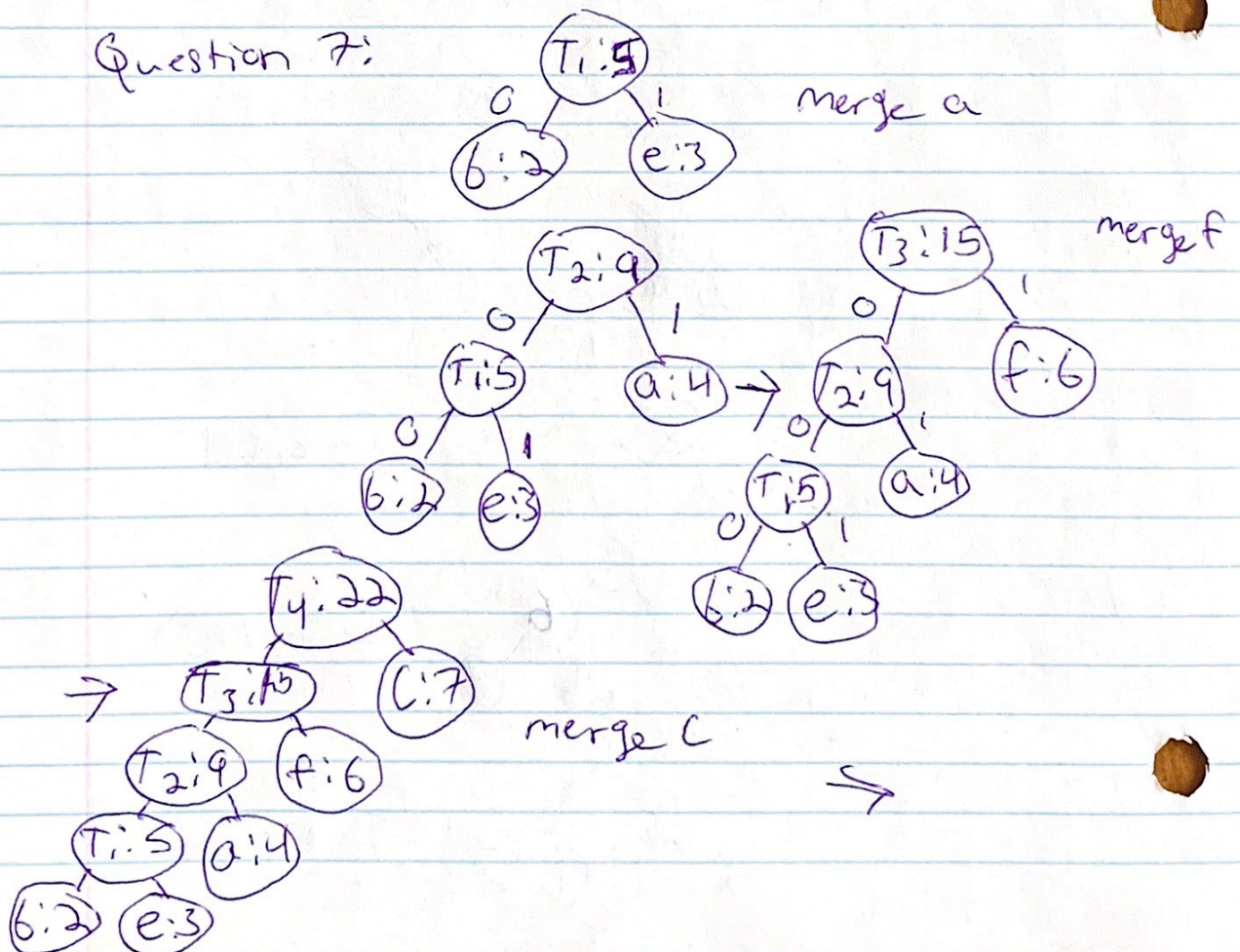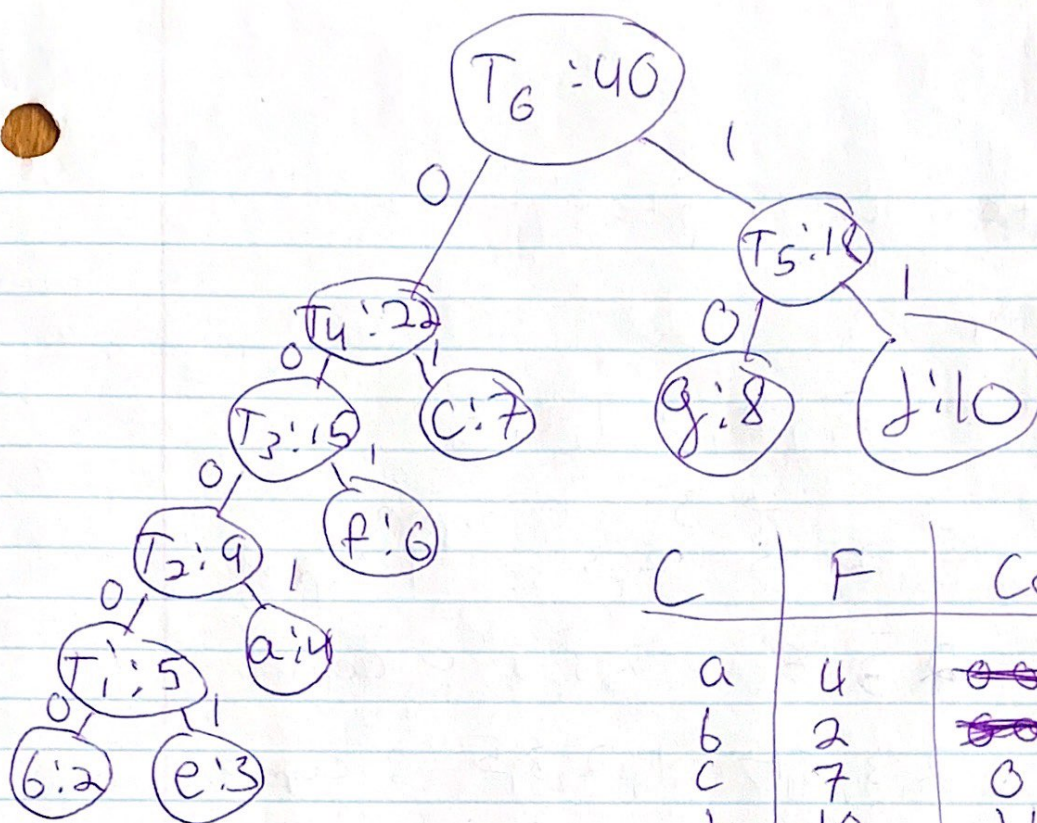
C	F	Code
a	4	~~00000~~ 0001
b	2	~~00000~~ 00000
c	7	01
d	10	11
e	3	00001
f	6	001
g	8	10

Question 8:

a) Pre-order: 8, 3, 1, 6, 4, 7, 10, 14, 15
b) In-Order: 1, 3, 4, 8, 7, 8, 10, 13, 14
c) Post-order: 1, 4, 7, 6, 3, 13, 14, 10, 8

Question 9:

S/T	null	X	Y	X	A	Y	A
null	0	0	0	0	0	0	0
Y	0	0	1	1	1	2	2
X	0	1	1	2	7	2	2
A	0	1	1	2	3	3	3
Z	0	1	1	2	3	2	3
Y	0	1	2	2	3	3	3
A	0	1	2	2	4	4	4

Question 10: Skip to

Question 13:

Values: 3, 2, 5, 1, 0, 7, 3

Step 1   3   → 3   0 comp.
     2   3, 2   → 2, 3   1 comp.

     3    $\overline{2, 3}$, 5 → 2, 3, 5   0 comp.

     4   2, 3, 5 → 1, 2, 3, 5   3 comp.

     5   1, 2, 3, 5, 0 → 0, 1, 2, 3, 5 4 comp.

     6   0, 1, 2, 3, 5, 7 → 0, 1, 2, 3, 5, 7   0 comp

     7   0, 1, 2, 3, 5, 7, 3 → 0, 1, 2, 3, 3, 5, 7 2 comp

     Sorted: 0, 1, 2, 3, 3, 5, 7