

1) (a) would make the best hash function for an 11-digit account number. (b) wouldn't be because for any 4-number combination in the positions 2, 4, 6, and 8, there are still 10 possibilities for each digit which equals 10^4 possibilities for any single cell. (c) wouldn't make the best hash function because no matter what the 11-digit account number is, all the keys will be mapped to 11. (a) would be the best because there isn't 10^7 possibilities for a single cell.

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26 42 5 44 92 59 40 36 12 60 80

Date: Dec 11

2.) 10a) Linear Probing ~~h(k) = k % 11~~
 $h(k) \% \text{size}$
 $h(k)+1 \% \text{size}$
 $h(k)+2 \% \text{size}$

44	12	80	36	26	92	5	59	40	42	60
0	1	2	3	4	5	6	7	8	9	10

59 4
60 5
42 8
80 2

b) Quadratic Probing $h(k) \% \text{size}$
 $(h(k)+1) \% \text{size}$
 $(h(k)+4) \% \text{size}$
 $(h(k)+9) \% \text{size}$

44	12	59	36	26	5	60	92	40	42	
0	1	2	3	4	5	6	7	8	9	10

insert 80
Can't insert 80

c) Double Hashing $h_1(k) = k \% 11$
 $h_2(k) = (2k) \% 11$ if expression $\neq 0$, else 1
 $h_2(k) = 1$ else

44	59	40	36	26	5	12	92	80	42	60
0	1	2	3	4	5	6	7	8	9	10

✓

v.l.r

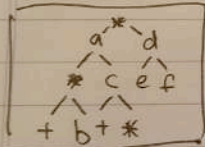
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1
2 3
4 5 6 7
8 9 10 11

Date

3

12a) $*a* + bc**def$



✓

b) Inorder (Left, Root, Right)

$+*ba+c**edf$

3) $T(1) = 0$

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Theory 3

right rotate 5 LL = left side, left child unbalanced
left rotate 3 LR = left side, right child
right rotate 2 RR = right side, right child
left rotate 3 RL = right side, left child

*1, 2, 3 Done from last assignment

4) {1, 3, 5, 7, 9}

- sum is 16 but no pair from set = 16.

{1, 3, 5, 7, 8, 9}

- no pair from set = 16

{1, 3, 5, 7, 8, 9, 10}

- 9+7 is 16. Have to select 6 unique numbers to guarantee at least **10** pair is equal to 16.

7

5) Must pick 81 to ensure you get an integer that is

divisible by 5. For every 10 integers picked (e.g.

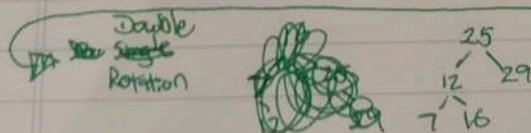
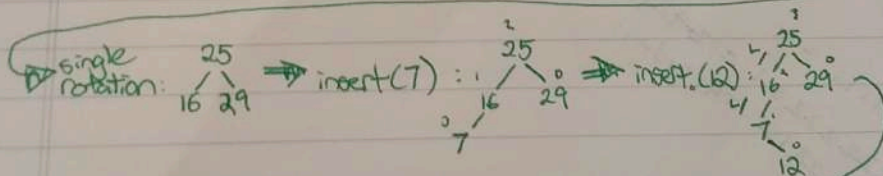
[1-10]), 2 are divisible by 5 (5 and 10). Consequently,

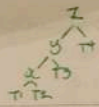
from 1-100, there are 20 integers that are divisible by

5. The first 80 numbers you pick could all not be

divisible by 5 so the 81st integer must be divisible by 5.

6) insert(16): 16 \Rightarrow insert(25): 16 \Rightarrow insert(29): 16 \Rightarrow insert(29): 16 \Rightarrow insert(29): 16

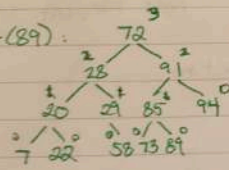




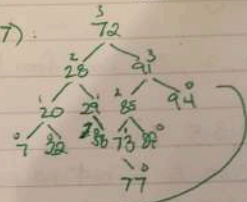
LL: y is left child of z. x is left child of y
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Date

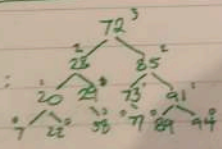
7) insert(89):



⇒ insert(77):



(Solve Problem)
 (Solve Problem)



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204 7 20 310

Date

8) insert(110):  => insert(210): 

