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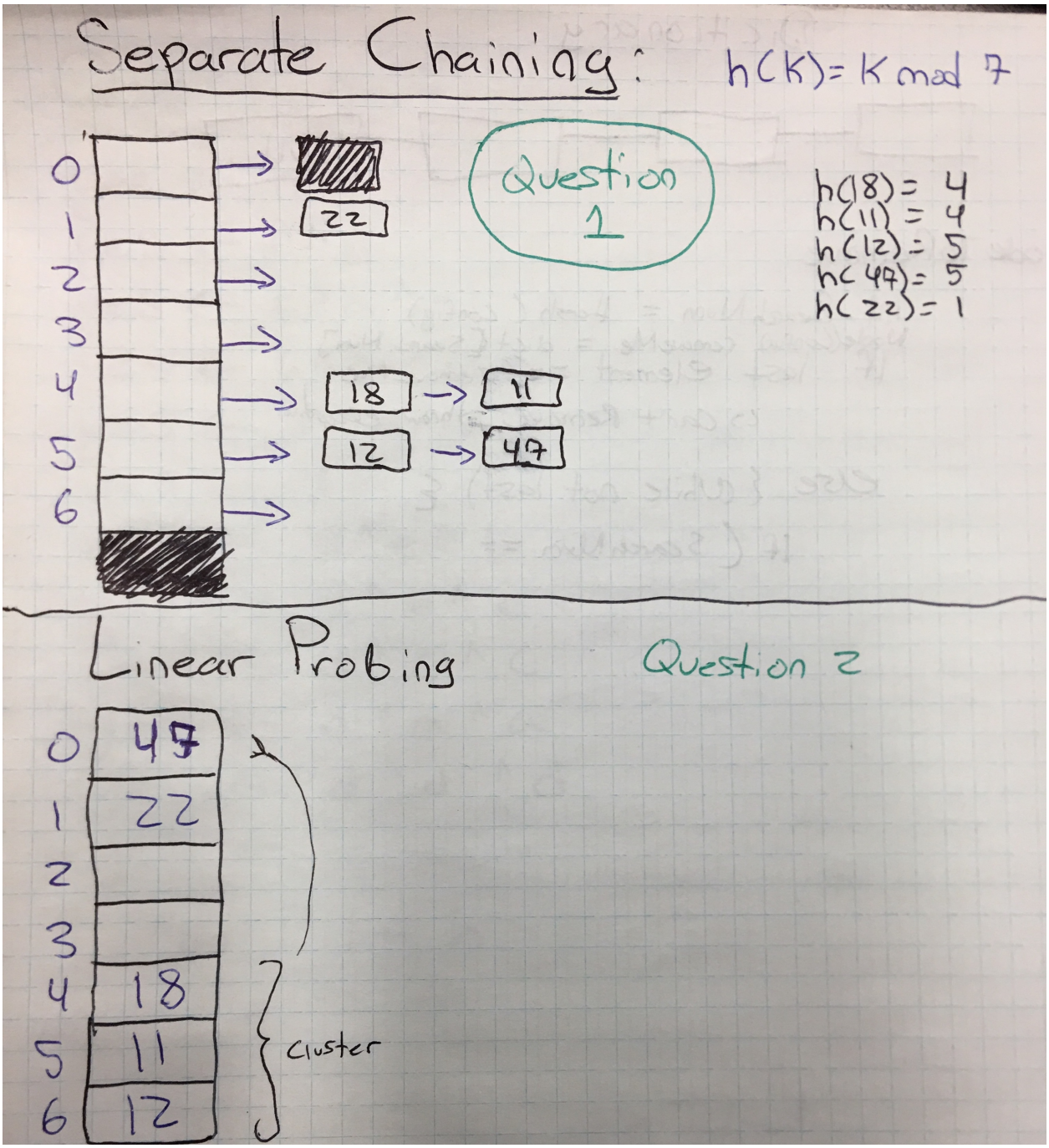
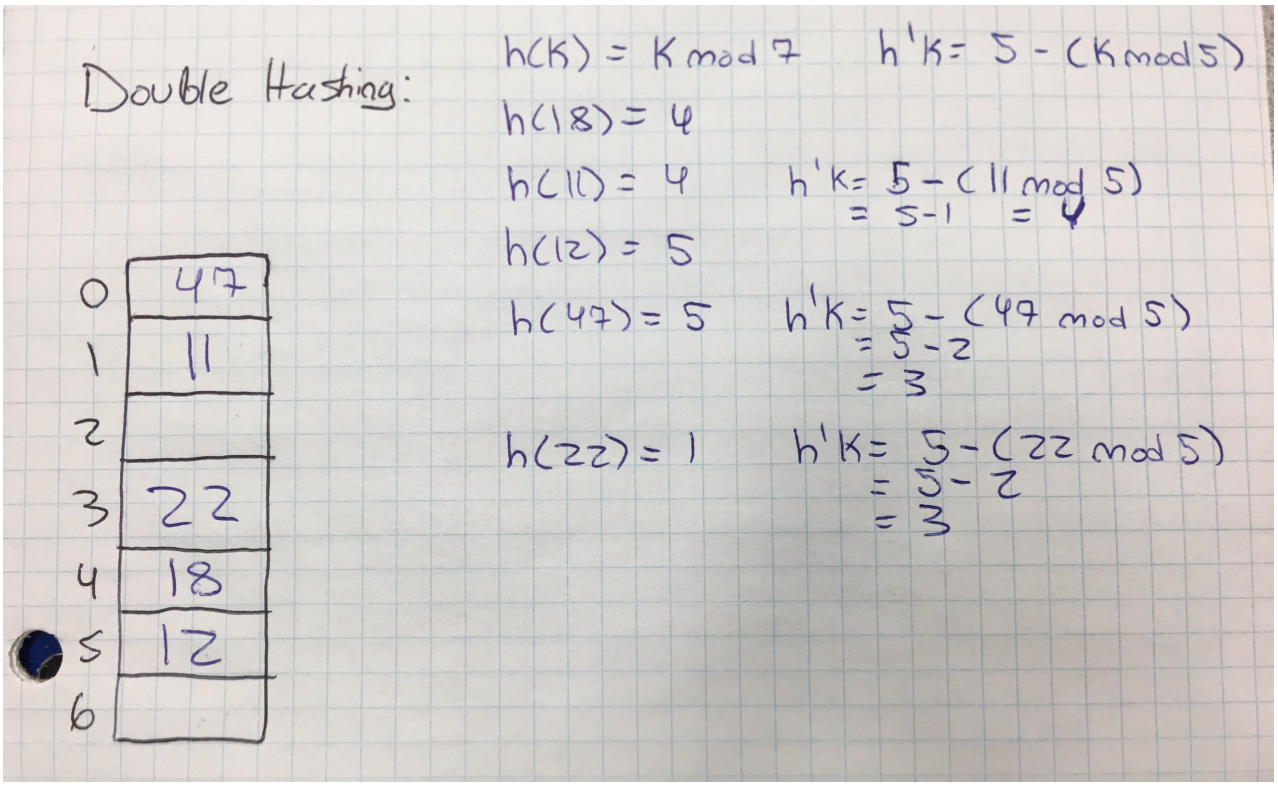
Assignment #3

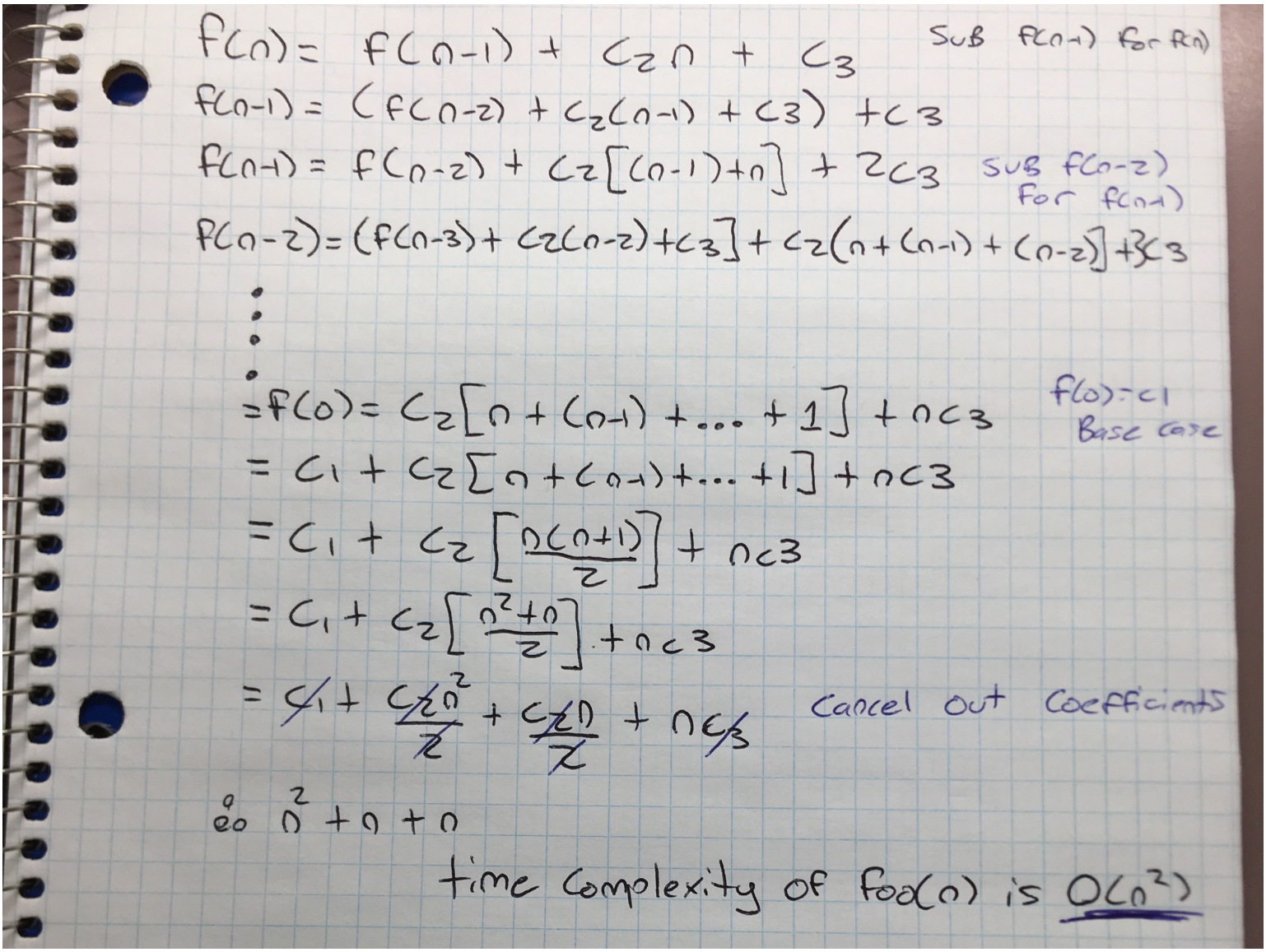
Question 1 & 2



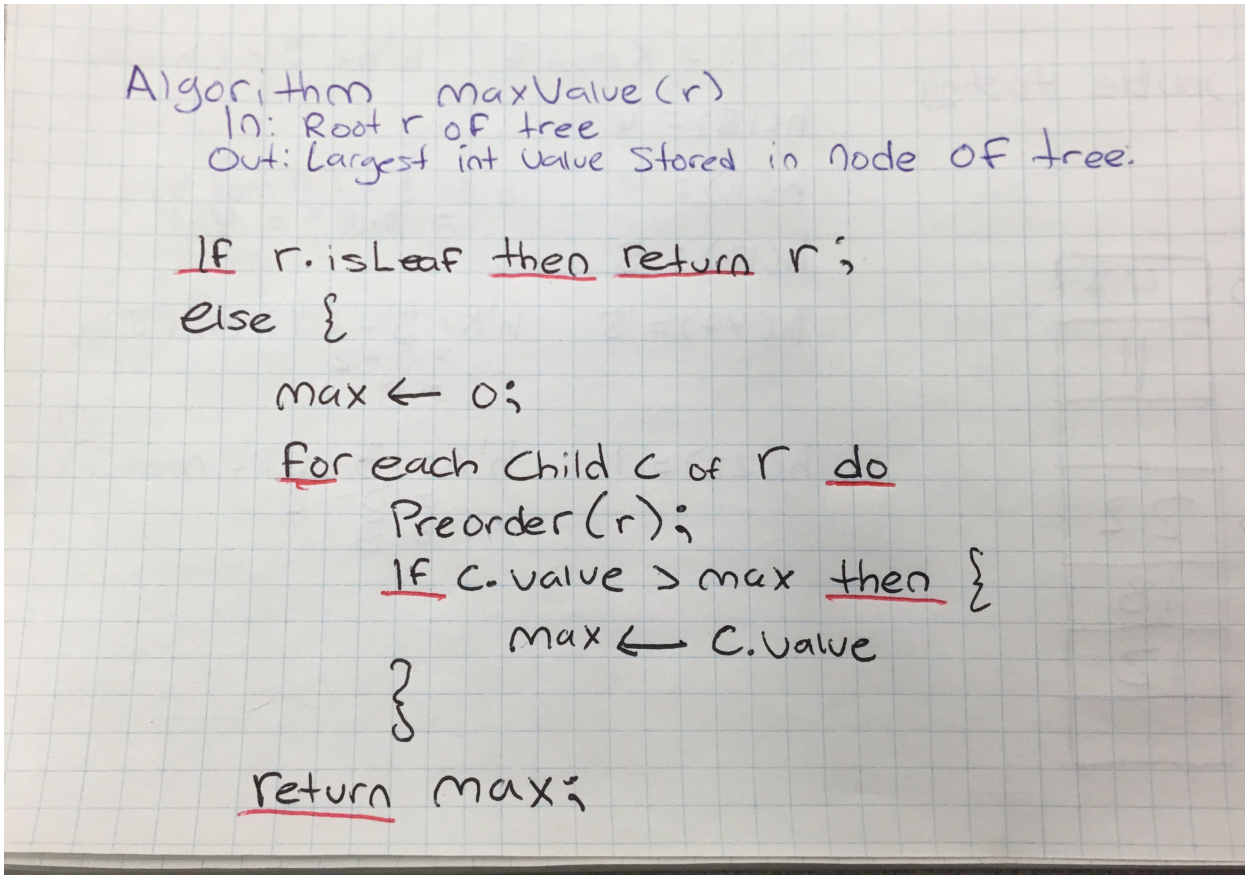
Question 3:


Double Hashing:
h(K) = K mod 7
h'K = 5 - (K mod 5)
h(18) = 4
h(11) = 4
h'K = 5 - (11 mod 5)
= 5-1 = 4
h(12) = 5
h(47) = 5
h'K = 5 - (47 mod 5)
= 5-2
= 3
h(22) = 1
h'K = 5 - (22 mod 5)
= 5-2
= 3
0 47
1 11
2
3 22
4 18
5 12
6

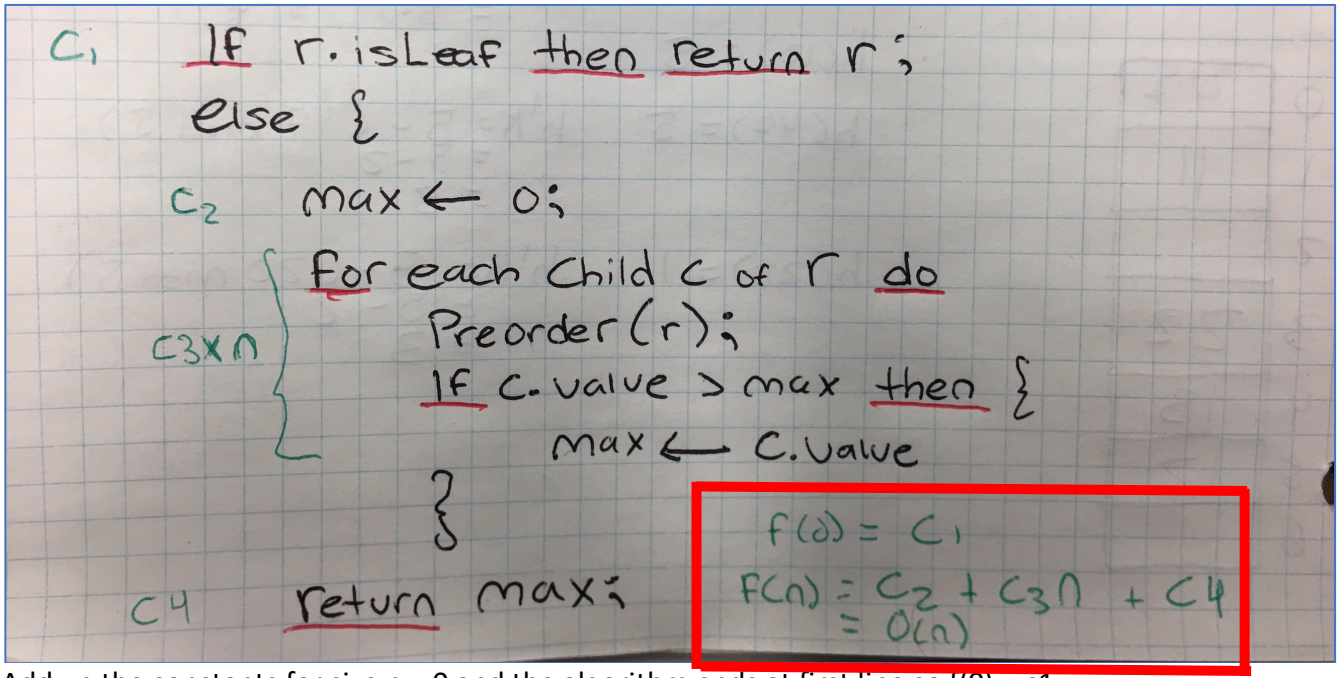
Question 4:


f(n) = f(n-1) + c2n + c3
Sub f(n-1) for f(n)
f(n-1) = (f(n-2) + c2(n-1) + c3) + c3
f(n-1) = f(n-2) + c2[(n-1)+n] + 2c3
Sub f(n-2) for f(n-1)
f(n-2) = (f(n-3) + c2(n-2) + c3] + c2(n + (n-1) + (n-2)] + 3c3
= f(0) = c2[n + (n-1) + ... + 1] + nc3
f(0) = c1
Base case
= c1 + c2[n + (n-1) + ... + 1] + nc3
= c1 + c2[n(n+1)/2] + nc3
= c1 + c2[(n^2+n)/2] + nc3
= c1 + c2n^2/2 + c2n/2 + nc3
Cancel out coefficients
e.g. n^2 + n + n
time complexity of foo(n) is O(n^2)

Question 5i:



Question 5ii:



Add up the constants for size n = 0 and the algorithm ends at first line so f(0) = c1
For size n, the algorithm has 2 constants and a 3 constant multiplied by n iterations via *"preorder(r)"*
Therefore, the time complexity of this algorithm is O(n) for n > 0