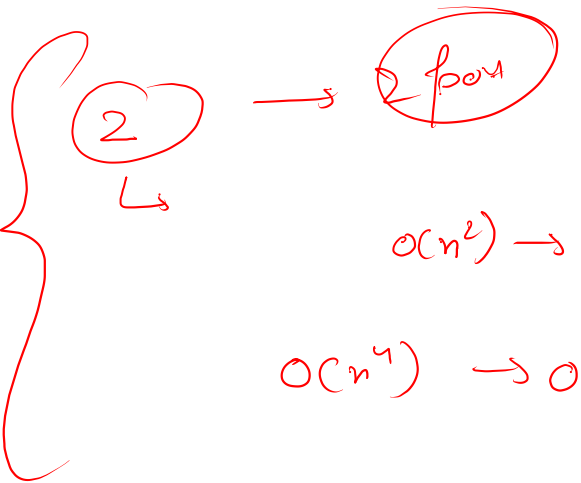
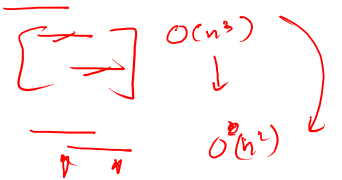
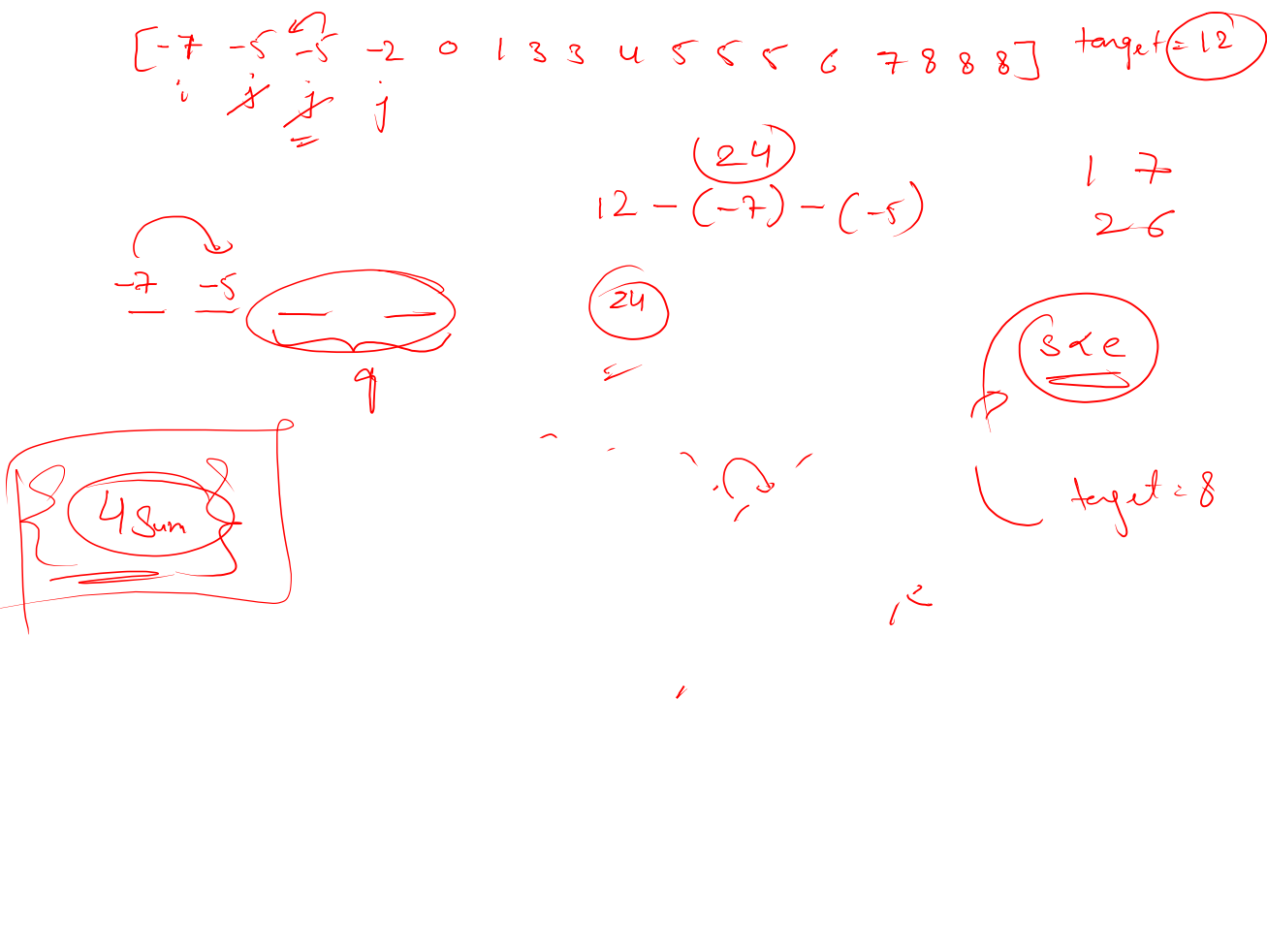
Four Sum

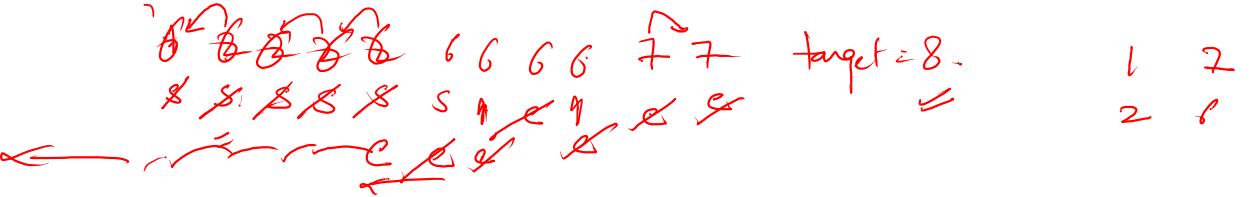




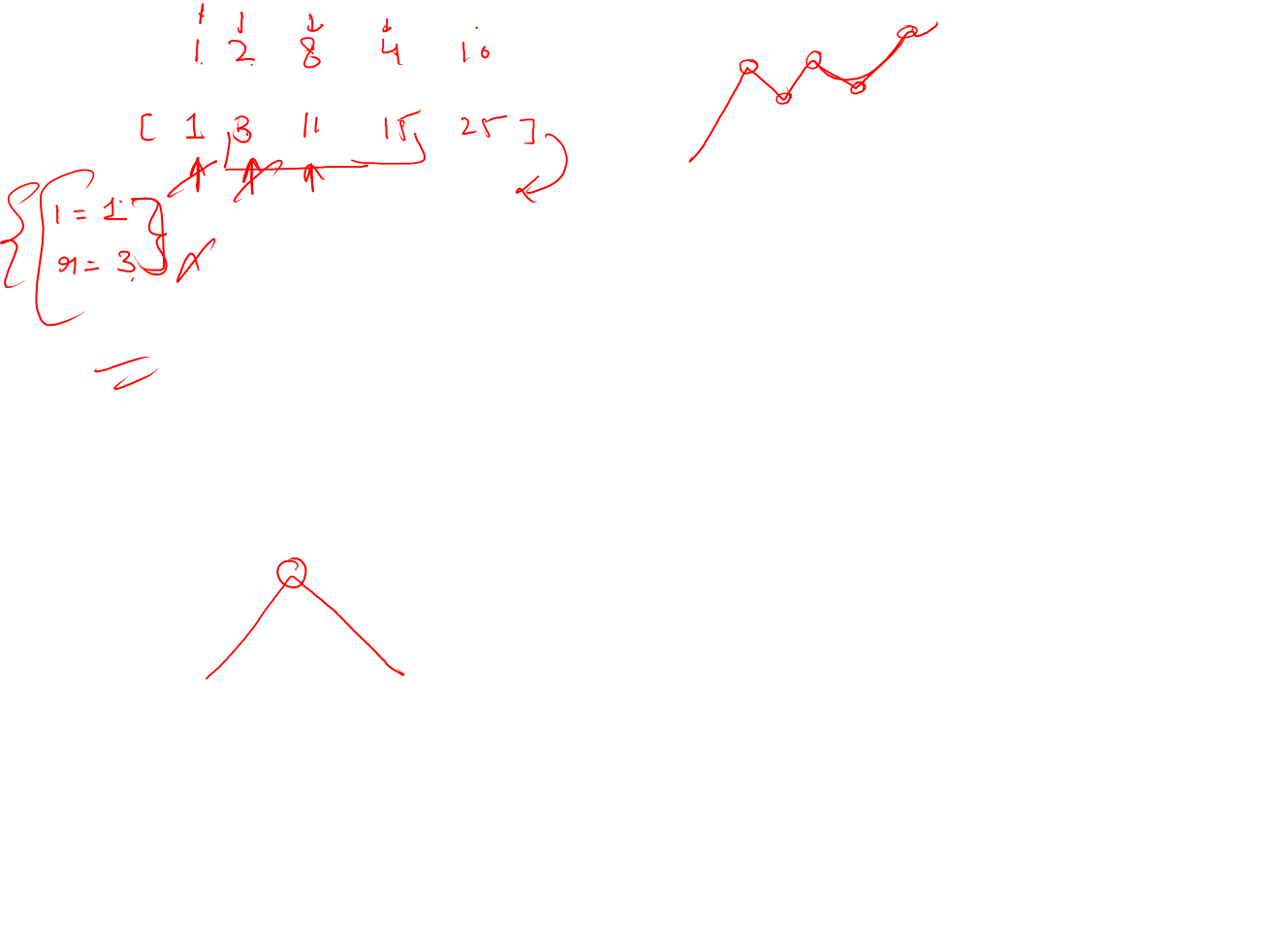
$O(n^2) \rightarrow O(n)$

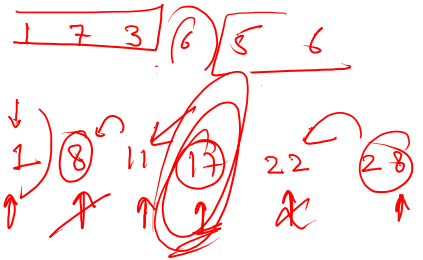
$O(n^4) \rightarrow O(n^2)$


[-7 -5 -5 -2 0 1 3 3 4 5 5 5 6 7 8 8 8]
target = 12
i
j
j
j
(24)
12 - (-7) - (-5)
1 7
2 6
-7 -5
q
24
4Sum
Sde
target = 8



```
while(s < e) {
    int sum = arr[s] + arr[e];
    if(sum == rt) {
        System.out.println(arr[i] + " " + arr[j] + " " + arr[s] + " " + arr[e]);
        s ++;
        e --;
        while(s < e && arr[s] == arr[s - 1]) s++;
        while(s < e && arr[e] == arr[e + 1]) e --;
    }
    else if(sum < rt) s ++;
    else e --;
}
```





11 = = 11

28 − 28

3

28 − 1

28 − 17

27

11

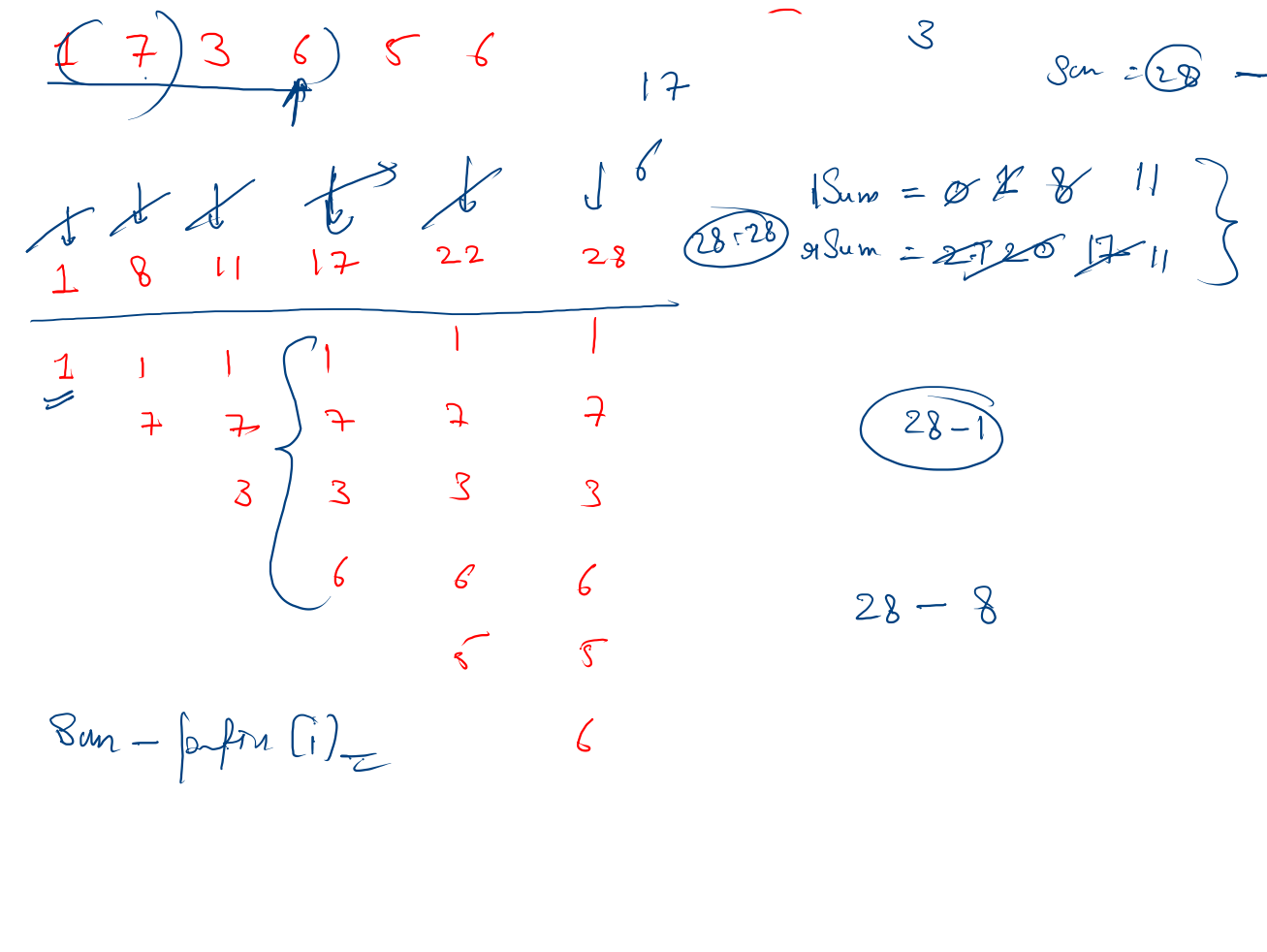
28 − 11

17

0

x_{27}

26


1 7 3 6 5 6
17
3
Sum = 28
1 8 11 17 22 28
28-28
Sum = 0 8 11
Sum = 17 11
1 1 1 1 1
7 7 7 7
3 3 3
6 6
5 5
28-1
28 - 8
Sum - pattern [1] = 6

1 2 3 4 5

K = 2

K = n + k

3

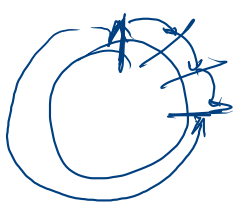
3 4 5 1 2

4 5 1 2

K = 3

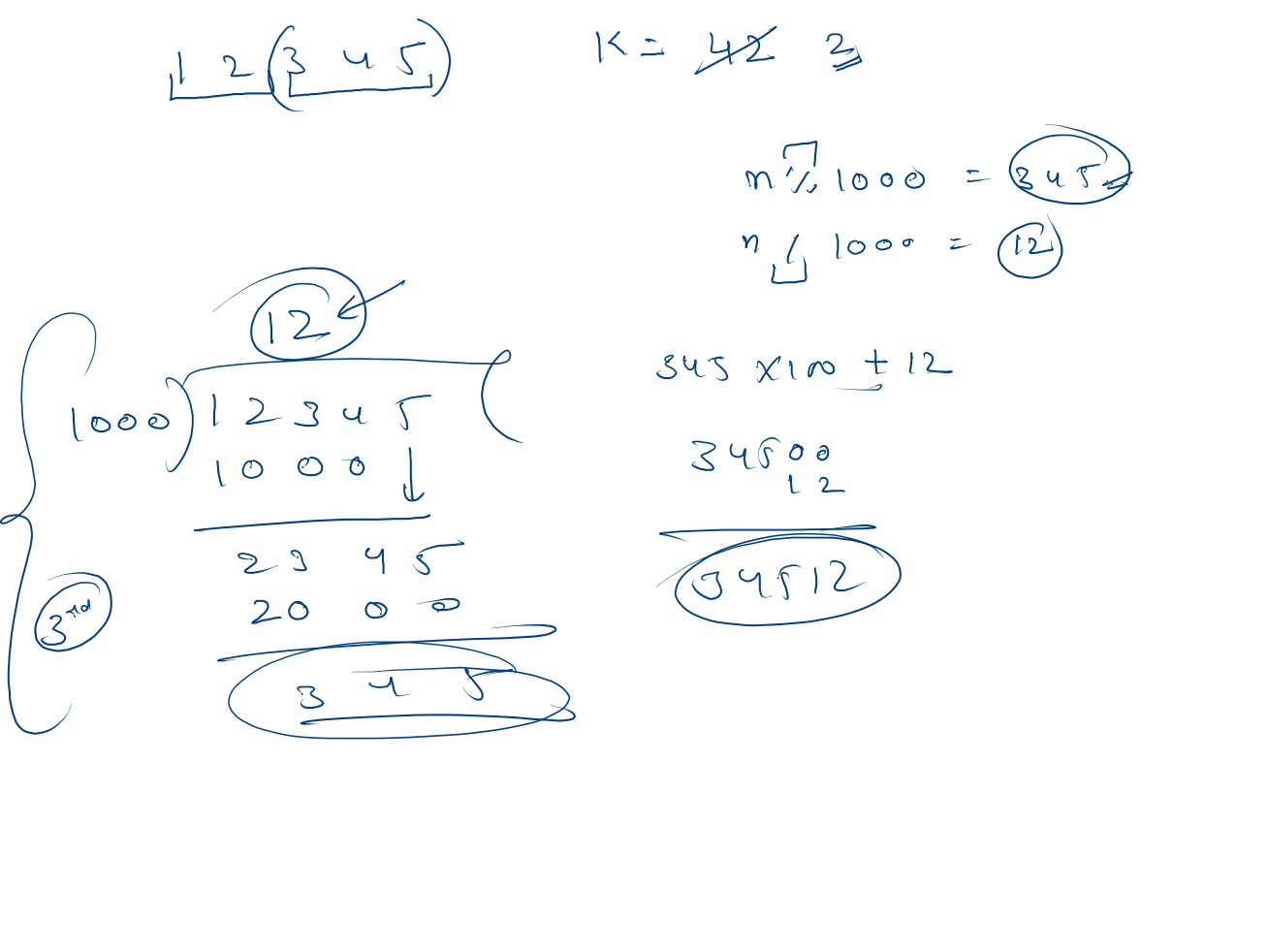
K < n

5 - 2 = 3



3

2


12345
K = 42 3
n % 1000 = 345
n / 1000 = 12
12
1000 12345
10000
2345
2000
345
3rd
345 x 100 + 12
34500
12
34512

2863147 num = 3147286 K = 4

Steps

1. Find no of digits —n→ n+K
2. Find divisor
3. Front part → num/div
4. Back part → num%div
5. Combine the → multiplier → 10^K

divisor = $10^{n-K} = 10^3 = 1000$

$10^K = 10000$

FP 3147286 / 1000 = 3147

BP - 3147286 % 1000 = ~~286~~

2860000
+ 3147

2863147

"a b c c d b b b d d a a a a c b c c d a" →

↑ ↑ ↑ ↑

→ ['a', 'b', 'c', 'c']

a: 6
b: 4
c: 5
d: 4

a → b → c → d

a: 6
b: 4
c: 5
d: 4

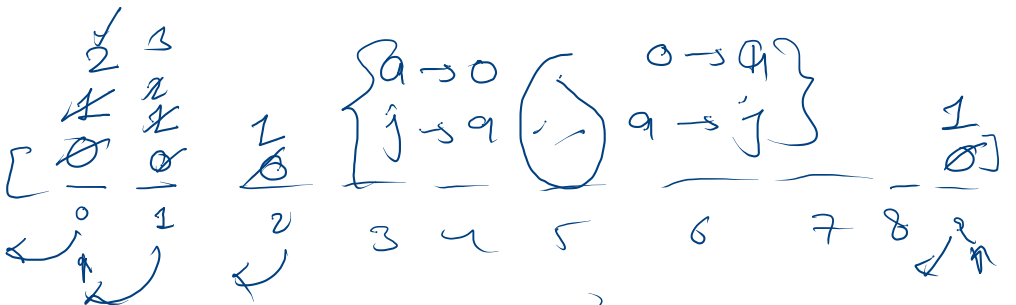
a: 6
b: 4
c: 5
d: 4

a → 0
b → 1
c → 2

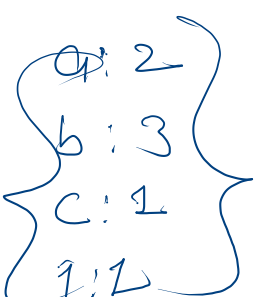
Sanni

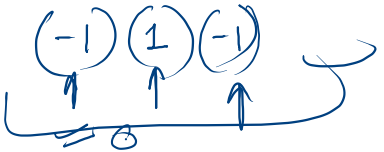
a a b b b c ... j

map



a → 0
b → 1
- - -




-1
1
-1