Skip-List:

A skip-list is built in layer is an ordinary ordered linked-list. Each higher layer acts as an "express lane", where an element in layer i appears in layer $i+1$ with some fixed probability p (two commonly used values for p are $1/2$ or $1/4$). On average each element appears $1/(1-p)$ lists, and the tallest element (usually a special head element at the front of the skip list contains $\log_{(1/p)}(n)$ lists.

* A search for a target element begins at the head element in the top list, and proceeds the horizontally until the current element is greater than or equal to target. The process is repeated after returning to the previous element and dropping down vertically to next lower list.

Input: {20, 30, 8, 47, 39, 18, 40, 24}

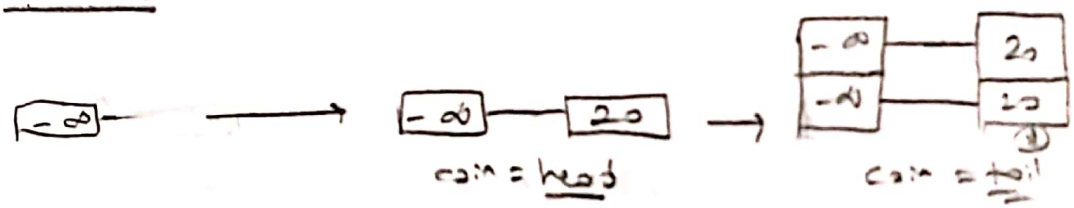
*There will be a coin for inserted number to get promotion 1 level up.

Head → inserted number has been promoted
Tail → " " protects location itself.

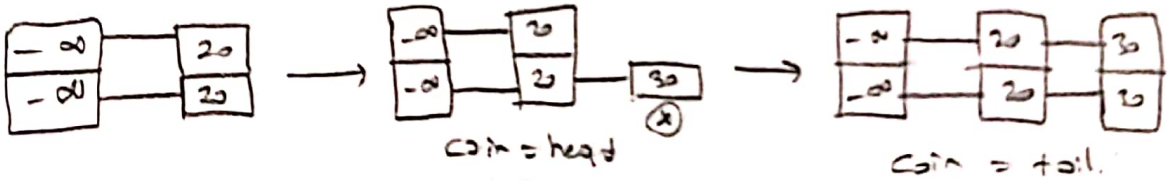
* There will be an abstract element in our bottom list which can represent $(-\infty)$ for avoiding infinite number of list.

* initial list = $-\infty$ * I will flip the coin until becoming tail and in this process inserted element gets promotion.

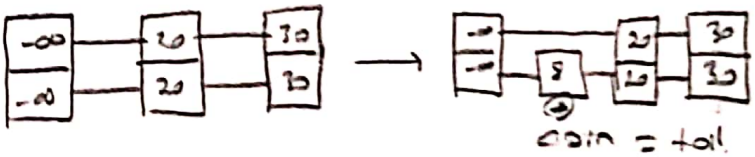
add(20)



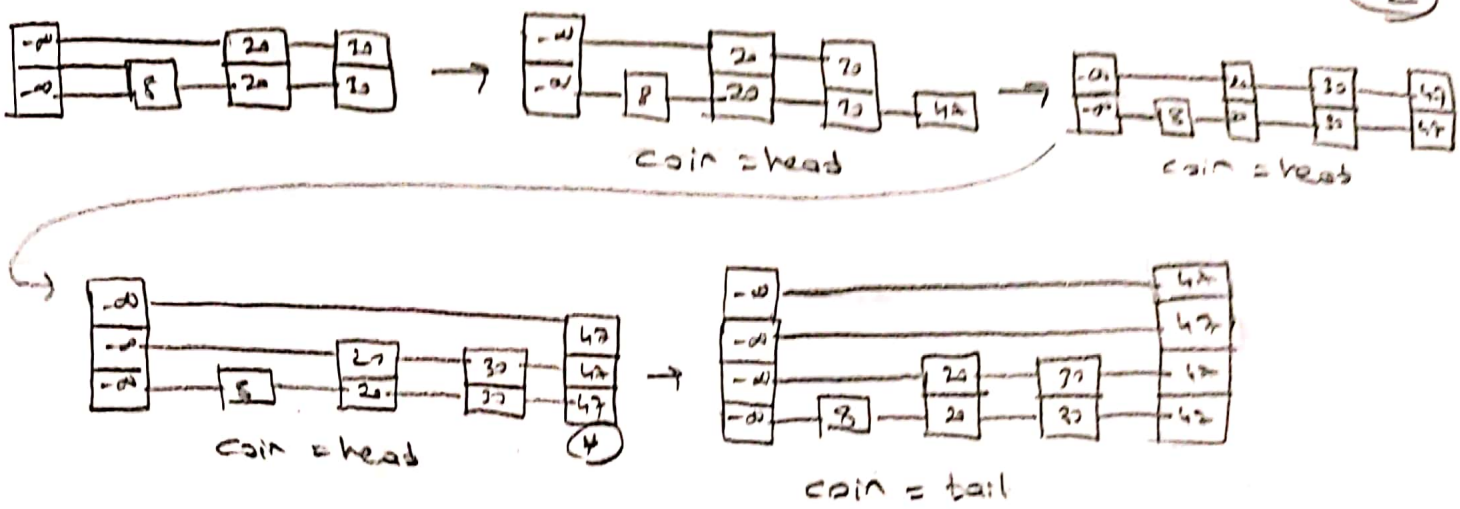
add(30)



add(8)

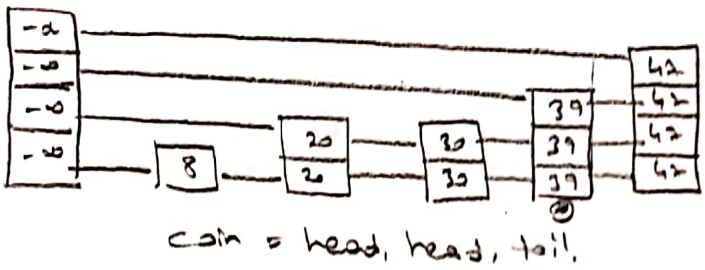


odd (47)



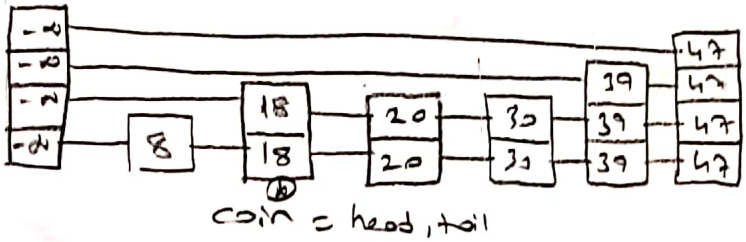
* After that point, due to list is so wide, I will just show added list structure after coin result.

add (39)



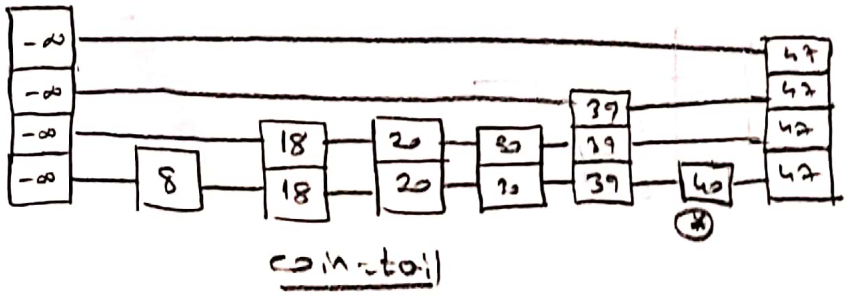
* After two times head, result go tail. 39 got 2 more promotion through upper list.

add (18)



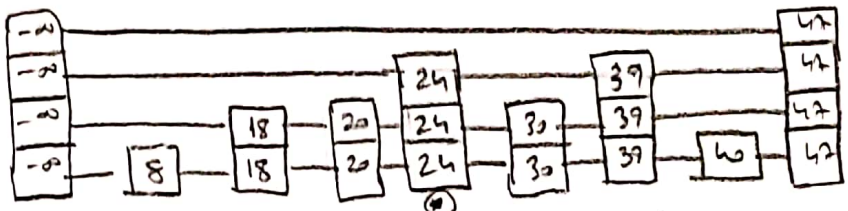
* After a time head, result go tail. 18 got 1 more promotion through upper list.

add (40)



* there is no promotion just inserted to bottom list.

odd(24)

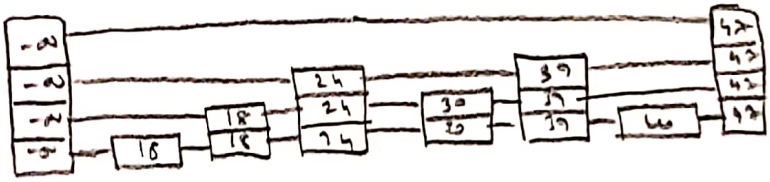


* After two times head, 24 got 2 more promotion through upperlist.

coin = head, head, tail.

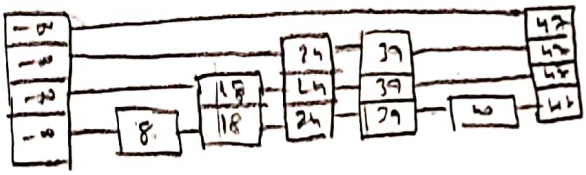
* removing will be simple, if element that we want to remove in the list. we delete this element all the way from top to bottom list. It is important to note that, deletion can affect complexities of function

remove (20)



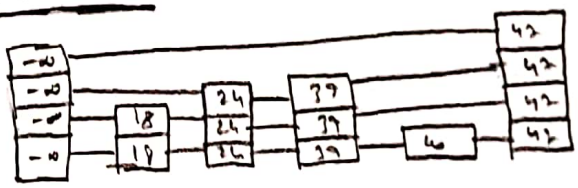
* 20 just removed from all the list.

remove (30)



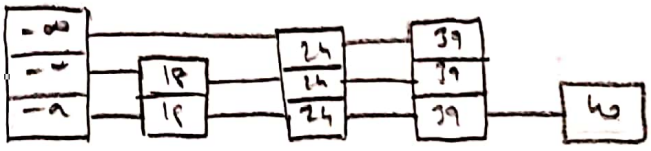
* 30 just removed from all the list.

remove (8)



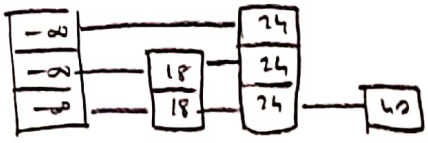
* 8 just removed from all the list.

remove (47)



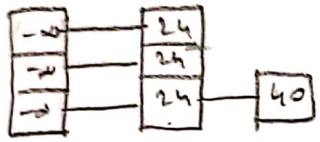
* 47 just removes from all the list

remove (39)



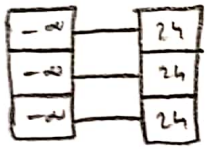
* 39 just removed from all the list.

remove (18)



* 18 just removed from all the list.

remove (40)



* 40 just removed from all the list.

remove (24)

* 24 just removed from all the list.
* There is no real element other than indicator minus infinity, so it means there is no element left. List is empty.