Binary search
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to search, we need a target to search and a place (search space) to search for that target.

Lets say we are looking to meaning of a word, where are we going to search for that word?

target search space

Kabul

books, newspapers, dictionaries

why dictionary not books? in dictionary the search space is ordered and there is no need of anothing whole dictionary

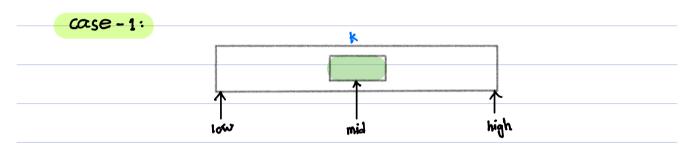
linear search: search the whole some by one.

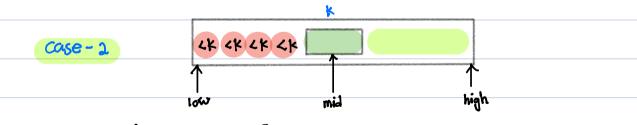
Binary search: Every time divide the search space into two sections and discard one of those sections.

Question: Given an array of integers, search for a tanget k;
Return True if the target element is Present.

$$arr = \begin{bmatrix} 0 & 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 & 10 & 12 & 14 & 16 \end{bmatrix} \quad k = 14$$

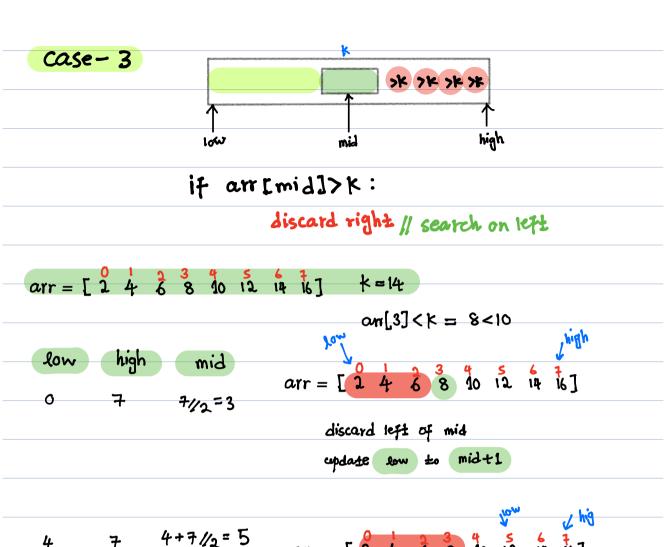
Binary search target = k





if arr [mid]<k:

discard left side // search on right



4 7 
$$4+7/2=5$$
 $arr = [2 4 6 8 10 12 14 16]$ 
 $arr[5] < k$ 
 $discard left af mid$ 
 $update 2000 \pm 0 mid+1$ 
 $arr = [2 4 6 8 10 12 14 16]$ 
 $arr[6] = = k$ 

return True