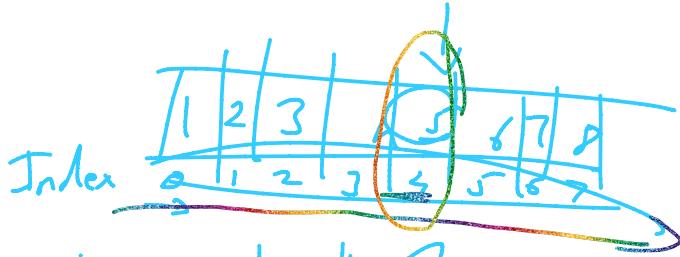


Searching

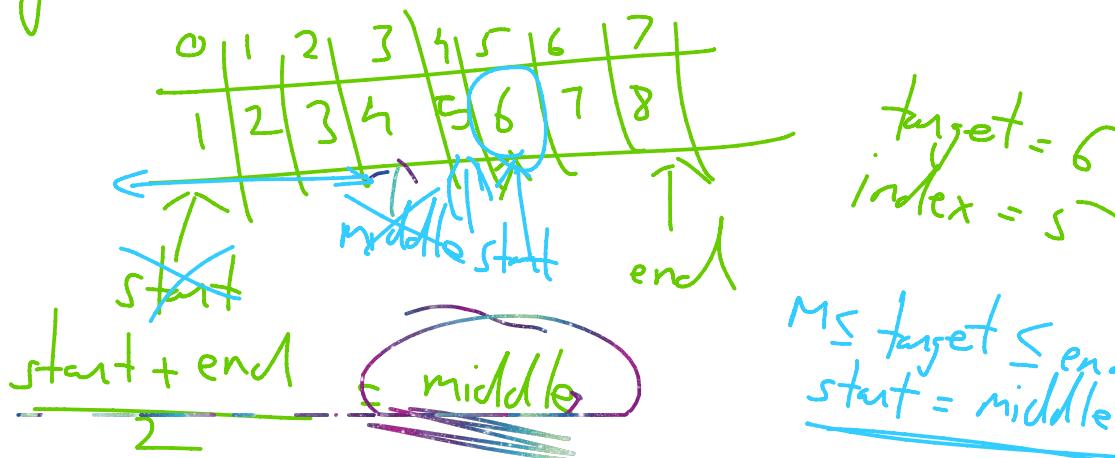


Search = 5 -

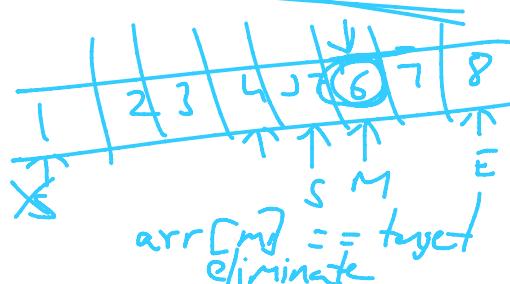
for loop i=0 to length of array:  
if arr[i] == target:  
    return i  
return -1

Linear Search = Time Complexity =  $O(n)$

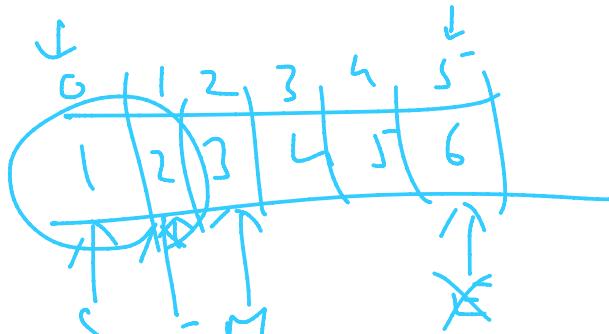
Binary Search = Time Complexity =  $O(\log n)$



$M \leq \text{target} \leq \text{end}$   
start = middle + 1



$$\frac{4+7}{2} = \frac{11}{2} = 5.5 \approx 5$$



$$\frac{0+5}{2} = \frac{5}{2} = 2.5 \approx 2$$

end = middle - 1

$$\text{end} = \text{middle} - 1$$

## Time Complexity

$$\text{Middle} = \frac{n}{2}$$



$$\text{start} = 0$$

$$\text{end} = \text{length of arr} - 1$$

while  $\text{start} \leq \text{end}$ :

$$\text{middle} = \frac{\text{start} + \text{end}}{2} =$$

if  $\text{arr}[\text{middle}] == \text{target}$ :

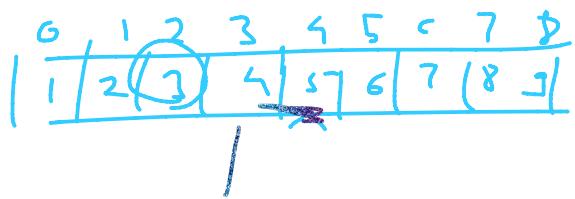
    return middle

else if  $\text{arr}[\text{middle}] < \text{target}$ :

    start = middle + 1

else if  $\text{arr}[\text{middle}] > \text{target}$

    end = middle - 1



$$\frac{0+8}{2} = 4$$

1

Search in Rotated Sorted Array



Pivot Element

$$= \text{Middle}$$

Alg:  $\text{start}, \text{end}$

$$s \leq i < e$$

while  $s \leq e$ :

$$\text{mid} = \frac{s+e}{2}$$

$$n$$

$\sim \sim$   
 $mid = (start + end) / 2$   
if  $arr[m] == target$   
    return  $m$

else if  $arr[start] \leq arr[middle]$ :  
    ↳ if ( $arr[start] \leq target$ ) and ( $target \leq arr[middle]$ ):  
         $end = middle - 1$   
    else  $start = middle + 1$

else if  $arr[middle] \leq arr[end]$ :  
    ↳ if ( $arr[end] \geq target$ ) and ( $target \geq arr[middle]$ ):  
         $start = middle + 1$       5      ↳      dd  
    else  
         $end = middle - 1$

return -1