Briung Search: T(n) 20(10gn)

BS (a, S, e, Key)

mod 2 Ste

il ste

il a [mid] > key

return BS (a, S, mids key) // BS (a[0:mid-1], key)

else If a [mid] < key

return BS (a, midfl, e, key)

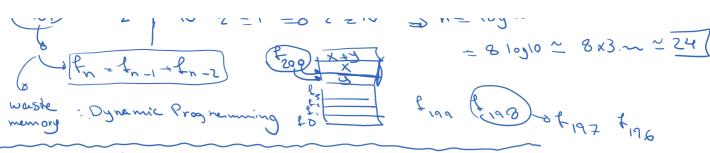
else // a [mid] = z key

return True

end

return False

Example: A marchine on she ownerage can run a single line/step in 10 sec. What is the langest input size in which



Similar to lab 7.6

Example: You near an algorithm with the time complexity of  $O(n^3)$  in Bsec. The input size was IO. How much time closes it take to run on single step on your happyop?

T(n) 2 0 (n3)

1 line To X see 2 lines To 2x V hiner in calle N N 3 = 8 (64) 3 X = 8

 $\frac{10^{12} \times -8}{\times -8 \times 10^{12} \text{ Sec}}$   $\frac{\times -8 \times 10^{12} \text{ Sec}}{\times -8 \times 10^{3} \text{ ns}}$ 

Example: for iz (:n

BS (a, key) //  $|a| = n^2 \log n$ , key in not in a latz n = 0 (hog n)

end

T(n) =  $\sum_{i \ge 1} T_{BS}(a, key) = \sum_{i \ge 1} O(\log(|a|))$ =  $\sum_{i \ge 1} O(\log(n^2 \log n)) = O(n(\log n^2 \log n))$ =  $O(n(\log n^2 + \log \log n))$ =  $O(n(\log n^2 + \log \log n))$ 

if i { n2 + 12123 - n2

BD (askey) // lay zn , key is the last

Use & n2+1, n2+2+~, n3

Schedion\_Sort(en) // A(n2) (reversed: 5 43 21)

 $T(n) = \sum_{i \geq 1}^{n^2} O(\log n) + \sum_{i \geq n+1}^{n^3} O(n^2)$   $\sum_{i \leq n}^{n^2} C = (b-\alpha n)(a)$ 

 $= O\left(\frac{v_{s}}{2} \log 2\nu\right) + \left(\frac{v_{s}}{3} - \left(\frac{v_{s}}{2} + 1\right) + 1\right) \Theta\left(\frac{v_{s}}{3}\right)$ 

= 0 ( ~ 10 du) + ( ~ ~ ~ ~ ~ ~ ) O ( ~ ~ )

= 0 (n2/09x) + 0 (n2 (n3-n2))

= 0 (n' 10gn) + 0 (n - m')

= 0 (n2 10 gn) + 0 (n5)

= 0 (n5) (V

Selection - Sort 8

az[5,2,4,6,4], |a|zn az[1,2,4,5,6]

$$T(n) \ge n + (n-1) + (n-2) + (n-3) + \cdots + 1$$

$$= \frac{n-1}{120} (n-i) = \frac{n}{2} i = \frac{1}{120} (n-i) =$$