DAA-LAB-OU:

- (0) INVERSION COUNT.
- (1) ALGORITHM Regulos:

Il input: array with choices of all the students

11 ourput: Total count investions.

11 This function calculates countinversions by brute torce

(- 11 1) 28 . 70x +2) 3/10/14 /11

Si Fit bionesi shilly

det CI-brute (students []):

-> for sin students: 17 gmil

n, count = len(s), o

-> for i'm range (n):

for j'in range (i+i, n):

Count ++

total & Count

-> return total

2. ALGORITHM - DAC WITH Mesge Sort

def mergeson (S[], L, r):

count = 0

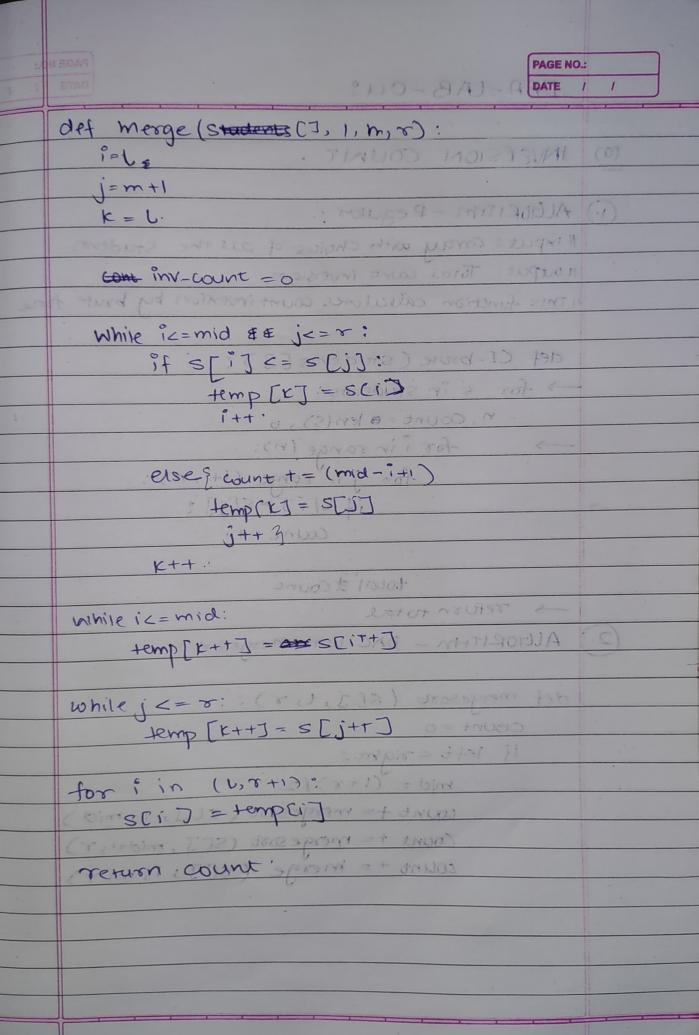
if left < night:

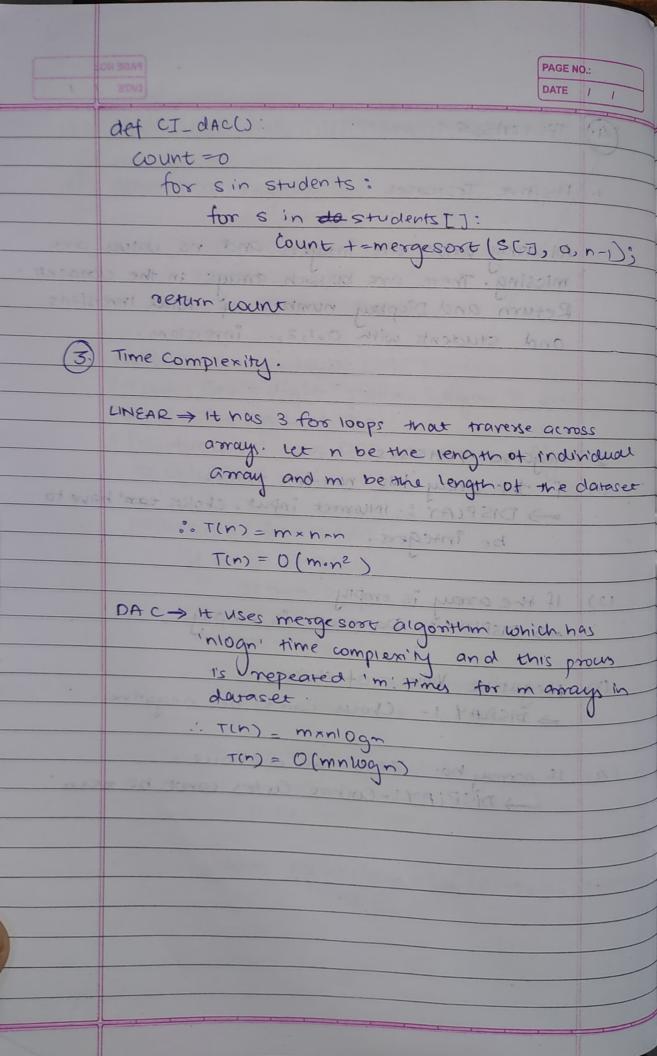
mid = (1+8)/2+64)

count t= mergesort (SCI), mid)

Count += merge sort (SCJ, mid+1, r)

count += merge (SCI) 1, m, r)





TEST CASES: 1. Positive Testcases All away values are integers and no values are missing. There are 100 such arrays in the dataset Return and Display number of Total Inversions and students with 0,1,2,... inversions. 3) Time Complexity. MINERE -> If YOU STON 1000 THAT TRAVERS OUT 2. neganier Test cases of A AN AND AND (1) If the array has non-int values -> DISPLAY: - INcorrect input, choices can' have to be integers. MANAM = (N)T 12) If the amony is empty DISPLAY: Datasets is empty - > AT (3) Negative Value suof choices > DISPLAY: - Choices can't be negative. (4) If array has zero' as a choice. -> DISPLAY: - Cource Codes compt be zero

-8A) - A DATE / / (b) KARATSUBA MULTIPLICATION det multiplication (x, y) a, b = str(x), str(y) result = 0forcivin ronger (len (b)):

dB = int (b[-1-i]) DID=0 (d)0= (plu), bullone for lin ronge (len(a))

dA = int (a[-j-1]) P=(dA*dB)+camp cary = P//10 pp += p* (10**). if carry > 0:

pp += carry * (10 ** len(0)) PP *= (10 * * P) result += PP return result

ALGORITHM - Karatsuba (DAC) 11 input: Two n digit positive integer n andy 1 Dutput: The product n+y. 11 This function uses DAC (Korratsuba Algorithm) to calculate product. M - do N = (N)T: Koratsuba (anta, intb): if a 210 or b 210 3 NOT return axb else: 1-mm= n/2 att, al = divmod (a, > 10**m) bH, bL = divmod (b, 10**m)

Zo = karatsuba (al, bl)

Zi = karatsuba (al, bl)

22 = karatsuba (ah, bh)

return (22)*(10**n) + (21-22-20)*(0**) + 20

Complexity will our agreetable of In caratsuba algorithm we conveit problem
of size 'n' into problem of size "12 and
recursively call the function throce Therefore: T(n)=3T(n/2)+0(n) By Masturegnial) Adultonia - MITTISTOTA

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bd = 2 - 10 a = 2 - sa : T(n) = n logba = h log 2 CIN -MOTER in regular multiplecation, we we a loops to share through every digit of each humber multiplying each digit taices constant time. of $TC = T(n) = O(n \times m)$ of m, n are digits in the now. $XO(n^2)$ if $n \approx m$ M 4300 +1



4. Testcases:

(1) Positive Testcases:

- (1) a = 123u = 5789012345 $b = 9876 \le 4321098765$ a * b = 121932631137021034431113635425
- (2) a = 987654321012345 b = 123456789098765a + b = 121932631246761025482140780925
- (3) a=123456789876543 b=987654321234567a+b=12193263133333086631194987481
- (2) Negative Test cases
 - (i) a = 123456 (One of the number 1's zero) b=0 0+b=0
 - (2) a = 123056 (number is not an integra) b = ""

Both numbers should be integers.

- (3) 9 = -1234 (numba is negative) b = 4567
 - a+b = -5635678
- (4) a = 12.3 b = 1234

 DISPLAY: Both numbers Should be integru.