| | CS 2023 - Take Home (Assignment of 1/1/1) |
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| 1 | is no beautiful that is so both a plant of the |
| | Question 4-01, (13) corrector metrople in in ething |
| | is used to describe on apper bound that corner be |
| | Big Omegal notatipp (-12) of brown ofto in salet |
| | Omega notation represents the lower bound of |
| 3 | the running time unof an algorithm. Therefore this provides |
| (1). | the best case time complexity for a given algorithm |
| | · Let g,f be & functions, Iforf(n) = 12 (g(n)) |
| | we can say that there exist positive constants c and |
| | no such that eg (n) = f(n), for all n > no |
| | · For an instant a let f(n) = 2112 and g(n) = n+3. |
| | aiven below shows the graphical design of given 2 |
| | functions, y north 13, find 2n and par 11 . |
| | $\int \int g(n) = n + 3m$ |
| | (1)0 200 |
| | |
| | Little = once a mortion (w) |
| tesent. | est agrittan eparas sille antitan de silla on relimic . |
| 2. | no signi pena pod sindo. 3/2 knood most sees ad |
| | From the above graph we can say that when |
| | (m) (m) (m) = 1 /2 and (m) = 13/2 1/2 n + 3 = 2n2 |
| inst | and stillethus, or roll and (ntis) ((n)) a 3 (n)? |
| 2 | sods done Son anytherection; f(n) to which disatisfy c.g(n) = f(n) |
| | Vn≥no, where) >c(is) pas positive : constants |
| | (a) e office) scan (be) said phologon) for fin) |
| | belongs to 2(g(n)). |
| | Fen)=n+e for L=1 and no=4 |
| | program y Escale |
| | 9+0>(8) |
| | (m) f = (m) p = 3 i |
| | In mathematical relationship as similar of |
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| | Little oh notation (a) |
| | · Big Oh is used as a tight upperbound on the |
| | growth of an algorithm whereas little oh notation is |
| - | used to describe an upper bound that eannot be |
| | tight in other words loose upperbounders and |
| 4.6 | |
| trong | |
| 4440° 1 | there's exists, man integer who such that for all |
| | into enanous fenomikaciagen) od 1 g dad a |
| | In the previous example wif ng (m) = 2 n2 and |
| | 1 f(n) = n+31 for1) (C=1 and no = 401, |
| . : . | YIN > noi= A sil n +131 1 Zm2 n? 101. |
| | ovie i osh losingorp sine outen) Lorargen) |
| | · In mathematical relation find = relation find = relation |
| | $\lim_{n\to\infty} f(n) = 0$ |
| | nsi gln) |
| | |
| | Little omega notation (w) |
| | · Similar to little oh notation little omega notation represents |
| | the loose lower bound where big omega represents |
| | 13AU John John Hight Howerlybound and side mail |
| | Let of and ing I be a functions funds wigin) or |
| | f(n) & w (g(n)) is itire when infor any impositive constant |
| P 7 (1 | 10.3 (10 thetheres exists (1) A possitive winteger not such that |
| | Eta teno V n > Policog cag CN) 2 fcn) dw on + aV |
| | (1) 12 For (rexample let fen) = 11+2 (and g(n) = 3 |
| | (1)(1) (1)(1) |
| ent Share | fen)=n+e for c=1 and no=4, |
| -2 | g(n)=3 \\ \n = n_0 = 4, |
| | 1/3) < n + 2 |
| | ie c.g(n) Lf(n) |
| | In mathematical relationship = lim f(N) = 0 |

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· ns c g(n).

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| | (3(h)) = (n); (n); (n); (n); (n); (n); (n); (n); | mptotic und und best care plexity but t t t. |
| | 342) = 10 = 10 = 10 = 10 = 10 = 10 = 10 = 1 | 2 |
| | & (9(n)) = { f(n): c,no. } o = (.9(n)) = (.9(n | |
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| - | 5 5 | best had |
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| | 2 (13 Ch.) 2 f Ch.) 3 f Ch.) . Ch. 3 | Asymptotic tower boun Lit may be the exact the exact the exact |
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| | · For any 2 functions | a (n' |) and | fin) | |
|------|--|-------------|----------------------|--|----------|
| | f(n) = O(g(n)) iff | | | The second secon | d |
| | | | = _1_(9 | | - 41 |
| | | 1-(1) | - 100 | 100 | - |
| | That is | - 1 | 4) | | - |
| | $D(g(n)) = O(g(n)) \cap \exists$ | 20 | ? . | - W | |
| | | | | | |
| | Purstion 03 | - | - | | |
| | | 3-6 | 112 | | • |
| (01) | Version · I | 2 4 | Worst C | THE SOL | <u> </u> |
| | for j = A.length to 2 do | | Cost | Time. | - |
| | for i = 2 to do | | C1 - | 1 n 2 3 | |
| | a J | - 1 | · C2 | n-1 | P |
| | Swapped = False | • | C3 | $\frac{2}{10(0+1)}-1$ | 2 |
| _ | if (A[i-1]> MA[i]) the | n | C4 - | n(n-1) | - |
| | 7 - 5 4 2 3 3 2 3 | | c ₅ | r(n-1) | 4 |
| | A[è] = A[è-1] | | Cb | <u>v(v-r)</u> | |
| | A[i-1] = temp | 3200 | L7 | 2 | <u> </u> |
| - | swapped = true | - 3 | , (8 | 2. | <i>Q</i> |
| | if if (! swapped) then | | Cq | <u>n</u> -1 | |
| | breat | 7 | C10 | 170 A | |
| | n = newLimit 3 | 5 4 | | - 53 | |
| | 7 7 | 4 | 2 | 3 y | 2 0 |
| | Worst Case - Reverse sorted a | TRY | | | Ž O |
| | Let n= A-length 3 : 3 = 3 | ζ. Ρ. | | | 0 |
| | $T(n) = c_1 n + c_2 (n+1) + c_3 (n^2+n) - c_3 + c_3$ | 4 Cr | $\frac{n^2-h}{2}$ +(| C8 +C1 + C | 7 t28 |
| | (n2-n) + cq(n-1) + c10.0 | | | 5 9 | - |
| | 2 - 4 | 0. 5 | F (5) | - 5 y | 12 |
| | = (c3+c4+c5+c6+c7+(3) m2) | +(c | 1+62+63 | 3-64-65 | -Cb |
| | -(7-C3) n 3- x2- C9-C3 | , 3 - 8) | 1.3 | <u>2 </u> | 3 (S) |
| | 2 3 L | P | | 5 En 2 | |
| | = CII nº + CIEn + CB | | | | |

| ring down June 1800 m | www drad Worstand | ase The |
|---------------------------------|--|--|
| n = A.length . Vitaliamos s | Cost Time | A+98 |
| do | C1 1 | |
| swapped = false. | (₂ n | 29 / (£0 |
| for i= 2 to n do 12 place | embolustofs 7. Dos | 1211 T. |
| if (A[i-1]>A[i]) then ago | | 105/15 |
| temp = A[i] | Cs <u>n(n-1)</u> | |
| ACIJ = A [i+1] a od | 13612 TOS CHEN! OCH-1) | 12111 |
| ETA [DEL] = 12 temp iou . 3 d | 1 23 Cm 3 x 9 102 | does |
| 21 quiswappedi= truelqillum | 110 (8 110) VISTA | AT |
| 21 Thew Limit = 2-11060 | 0 has 29 900 12 | ri As/co |
| n=newLimit | C10 001 10 10 -1) | 12000 |
| while swapped | C ₁ n. | |
| | CIRILGUAXI | QD 01 |
| Ū— | In at 1= in a | 7 |
| Morst case reverse sorte | artay 1= (70+ | |
| | 1 | |
| T(n) = C1+ nC2 + nC3 +/ 12 | -n =11) C4 + (n2-n) C | 5 + 66(|
| +(C7+ C8+ C9 + C10) n2-r | + (C1 + C12) n 2 | |
| 9 | | |
| = C13.72 + C14. 7 + C15 | 1 1= X 107 | popular la |
| $= \Theta(n^2)$ | 1 | |
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