CSCI203: Algorithms and Data Structures

Assignment 2 Solutions

Question 1a, 1b and 1c:

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6	la The data are 3,27,9,0,61,38,14,48,25,19,7,0,24,39,8,					
	S1 = [3, 27, 9]					
	SI = []					
	Q1 = [37					
	S1 = [61, 38, 14, 48, 25, 19, 7] (7)					
	SI = [] (n + on) + por old =					
	Q1 = [3,61,38,14,48, 25]					
	51 = [24, 39, 8, 29, 14]					
	Q1=[3,61,38,14,48,25,24,39,8]					
	The second of th					
F) node-Position = 0					
	walker = phead //start from head of the list, index 0 2 000 = 0000					
	(n 2 mg x 2 n) 0 =					
	while (nodeposition < 3) AND (walker is NOT NULL) 1/ Traverse until the ath					
	walker = walker. link // move to the next node					
	holePosition = nodePosition + (ETARAGE-NITE(N)T					
	END while Exalter (1-N) = + (1-1-n) T =					
	THE THE TOTAL SUFTER STATE OF THE TOTAL STATE OF TH					
	IC Walker : NOT NULL Then (1-11) & + & + (1-10) & + (5-10) + - (0) T = (0) T					
	If walker is NOT NULL Then (1-11) 8+8+(1-1-11) 87 (1-1-11) += (10) T					
	If walker is NOT NULL Then (1-10) & + & + (1-1-11) & + (1-1-11) + = (10) +					
	If walker is NOT NULL Then (1-10) 8 + 8 + (1-1-11) 87 (1-1-11) + 2 (10) T walker. Content = 'L' 8 + 8 + (1-10) 8 + 8 + (1-10) 8 + 68 - 10) 1 8 End If					
	If walker is NOT NULL Then (1-10) & + & + (1-1-10) & + (1-1-10) + = (10) +					
	If walker is NoT Null Then walker. content = 'L' + + (+-1) = + + (+-1) = + (
	If walker is Not Null then walker. Content = 'L' + + (-n) & + + (-n) & + (-					
	If walker is NoT Null Then Walker. content = 'L' + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + (-1) = + + + + + + + + + + + + + + + + + +					
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	If walker is NoT Null Then Walker Content = 'L' End If Function find offending parenthesis (s: string) > Integer: Create empty stack: for i from 0 to (Length - 1): If s[i] == '(': Push i to stack // store position of 'C': Byse If s[i] == ')': if stack not empty: pop stack // match found, remove '(')					
	If walker is NoT Null Then Walker Content = 'L' End If Function find offending parenthesis (s: string) > Integer: Create empty stack: for i from 0 to (Length - 1): If s[i] == '(': Push i to stack // store position of 'C': Esse If s[i] == ')': if stack not empty: pop stack // match found remove '(') else:					
	If walker is NoT Null Then Walker Content = 'L' End If Function find offending parenthesis (s: string) > Integer: Create empty stack: for i from 0 to (Length - 1): If s[i] == '(': Push i to stack // store position of 'C': Byse If s[i] == ')': if stack not empty: pop stack // match found, remove '(')					

Question 2a, 2b, 2c and 2d:

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	Carlot and the carlot
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2a)	10, 2, 2, A, K, L, C,
	Preorder: A, Z, M, O, E, A, Z, R, L, L
200.00	The state of the s
	Binary tree: A
	2
	Eng No of 21/28 45 41 0% If the 1963
	A L
- \	Par 27 # AVI Trad 20
JP)	BSI: LT AVL MEE: 30
	17 32 27 32
	15 30 38 17 28 38
	27 30
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	그렇게 되는 그는
24)	The worst-case time complexity for building with n nodes is $O(n^2)$, because i
28)	Tables A Comment Tables and the last of th
24)	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a botal construction time of $O(n^2)$. The worst case bacquain time complexity for building an AVL Tree with n rodes
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst (ase those name time complexity for building an AVL Tree with n rodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements of $O(n\log n)$
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst (ase bacepair time complexity for building an AVL Tree with n rodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst (ase transporting complexity for building an AVL Tree with n rodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$
2d) 7	The worst-case time complexity for building with 10 nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst case becomes time complexity for building an AVL Tree with 10 rades $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed P.T.? if I is noticed P.T.?
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst (ase transporting complexity for building an AVL Tree with n rodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a otal construction time of $O(n^2)$. The worst case together time complexity for building an AVL Tree with n nodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed. The interest of the particular takes in $O(n\log n)$.
2d) 7	The worst-case time complexity for building with 10 nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a stall construction time of $O(n^2)$. The worst case becomes time complexity for building an AVL Tree with 10 rades $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed P.T.? if I is noticed P.T.?
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a otal construction time of $O(n^2)$. The worst case together time complexity for building an AVL Tree with n nodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed. The interest of the particular takes in $O(n\log n)$.
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a otal construction time of $O(n^2)$. The worst case together time complexity for building an AVL Tree with n nodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed. The interest of the particular takes in $O(n\log n)$.
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because in the tree becomes skewed, each insertion takes $O(n)$ time, leading to a otal construction time of $O(n^2)$. The worst case together time complexity for building an AVL Tree with n nodes $O(n\log n)$ because each insertion takes $O(\log n)$ time, and inserting n elements in $O(n\log n)$. It is noticed. The interest of the particular takes in $O(n\log n)$.
2d) 7	The worst-case time complexity for building with n nodes is $O(n^2)$, because the tree becomes skewed, each insertion takes $O(n)$ time, leading to a otal construction time of $O(n^2)$. The worst (ose baceman time complexity for building an AVI Tree with in rodes $O(n\log n)$ because each insertion takes $O(\log n)$ time and inserting in elements in $O(n\log n)$. It is notice: Deturn these

Question 2e:

	No.
	Date
def is_sub_tree (P,7): 1 0 2 0 M 124 , FL , FF , M , F2 , 21 22 : OWNERS
IT I IS NOWE:	11 Love 300 (23 K
heturn True	SE SE SE AN ENTIRE SERVICE SER
if P's None:	1 201 18 28 44 44 44 45 46 40 40 40 40 40 40 40
neturn False	+ 9 01 + 0 3 (1 1 2) 0 (430)
if is_identical (p;	T)
return True	01-6-8-4-9-5-4-6-2-1-0
neturn is_subtrea	e(P.1eft, T) or is_subtree(P.194t, T)
of the life of the f	The same of the sa
det is_identical(P,T)	De harried and a second
if P is None and	T is None:
	0178 400 844 8 1 1 0 0
if p is none or	Tis None:
neturn false	t3 es 21 11 12 22 25 15 22
neturn (P. Val ==	T. Val and
	(D jack and T. 1944 and
is_identical	cl. let band, i. let die
is_identical	cl. let band, i. let die
is_identical	Cl. 161. Bank 1. 16.1. Ch.
's_identical	(P. right, T. right))
is_identical	((P. right), T. right)) # 0 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1
is_identical	1(P. right; T. right)) # 0 1 0 1 0 10 10 10 10
is_identical	17(2 10 2) 10 10 10 10 10 10 10 1
is_identical	1(P. right; T. right)) # 0 1 0 1 0 10 10 10 10
is_identical	(P. right, T. right)) # 0 1 0 2 0 100 1100 1 100
is_identical	(P. right, T. right)) # 0 18 0 18 0 12 0 150001 17(2 1000 2) = (A) 10 11 1000 ((A) 10 10 10 10 10 10 10 1
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is_identical	(P. right, T. right)) # 0 18 0 18 0 10 100 11 1 100 100 11 1 100 100
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is_identical	(P. right, T. right))
is_identical	(P. right, T. right))
is_identical	(P. right, T. right))

Question 3a, 3b and 3c:

110	163 97 year . on
SA	vames: 35, 35, 54, 30, 77, 59, 65, 96, 125
	h(x) = x mod 11
	X: 55 35 54 30 77 59 65 96 125
	n(x): 0 2 10 8 0 4 10 8 4
	The transfer of the transfer o
	0 1 2 3 4 5 6 7 8 9 10
	+ VI man + bearing at the VI Have A bearing a money
	55 35 59 30 54
	77 175 96 65 1 93 122 1900 1124 450
	* Smile of T 444 375 A = 17
4)	0 1 2 3 4 5 6 7 8 9 10
+	55 77 35 65 59 96 125 30 54
1	
()	x: 55 35 54 30 77 59 65 96 125
1	h(xi): 0 2 10 8 0 4 10 8 4
2	h'(a): 3 81 5 6
	$h'(x) = (x \mod 5) + 1$
	H(x): (h(x)+ixh'(x)) mod 11
	H(96) = (8 +1x2) mod 11 = 10 (collision)
10	H(a6) = (8 + 2x2) mod 11 = 1 (collision)
1	H(96) = (8 + 3x2) mod 11 = 3 (collision)
gles	$H(96) = (8 + 4x2) \mod 11 = 5 m (realistral)$
+	ANAPUERAZIENOGUNA
+	H (125) = (4+1x1) mod 11 = 5 (collision)
+	H (125) = (4 + 2x1) model = 6
+	
1	0 1 2 3 4 5 6 7 8 9 10

Question 3d:

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10 h'(z,i) =(h(x	10.51 + 0.	5 12) mod 11	1872 (MI W)	Hopen to tribuline th
	374	10011	· 1/+1	
α: 55	35 54 30	77 50 601	97 125	
h(x): A 9 0	2 10 8	0 4 10		
h'(x,i):		10-10-5		
	William Control			Also to dismit lated
h'(77,1)=(0	+ 0.5 + 0.5)	nod 11 = 1 1 hor	Podali	A PERSONAL PROPERTY OF THE PERSON NAMED IN COLUMN 1
n' (65,1) = (1	0 +0.5 + 0.5) 0	and 11 = 40 (callisian)	
h' (65,2) = (1	0+1+2)~	10d 11 = 7 /	callician	
h'(65,3) = (10+1.5+4.5)	10d 11 = T	all fituar	s yoursupply leter
n' (96,1) = (8 + 0.5 +0.5 / 1	40411 = 9	££	
W (125,1) = (collision)	
h' (125 12) = 1				2+21+ Apply 10th.
1 7 1 1	any end of	10 - 10 - 1437 "		100 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
0 1 2	3 4 5	6 7 8	9 10	
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Question 4:

Screenshot of the output

```
Total number of messages processed : 942
Average arrival rate : 31.40
Average number of messages sent per minute : 22.27
Average number of messages in the queue per minute : 140.67
Number of messages sent on 1st attempt : 536
Number of messages sent on 2nd attempt : 102
Number of messages sent on 3rd attempt : 24
Number of messages sent on 3rd attempt : 0
Average number of times messages sent on 5th attempt : 0
Average number of times messages had to be requeued : 0.35
Press Enter to terminate
```