UnansweredQuestion 1
/ 1.5 pts
An ordinary, singularly-linked list can be traversed forward or backward.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 2
/ 1.5 pts
An ordinary, singularly-linked list allows individual links to be placed in any available place in the heap (free store).
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 3
/ 1.5 pts
An ordinary, singularly-linked list requires a contiguous block of memory to hold all the links.
True
Correct Answer
False
Additional Comments:
Haraman and Overstien A
UnansweredQuestion 4

An ordinary, singularly-linked list has an insertion time of O(1) for inserting an item into the list.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 5
/ 1.5 pts
An ordinary, singularly-linked list has a deletion time of $O(1)$ for finding and deleting an item based on keys.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 6
/ 1.5 pts
An ordinary, singularly-linked list has a replacement time of O(1) for finding and replacing an item based on keys.
True
Correct Answer
False
Additional Comments:

/ 1.5 pts

UnansweredQuestion 7

/ 1.5 pts
An ordinary, singularly-linked list has a retrieval time of O(1) for finding and returning at item based on keys.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 8
/ 1.5 pts
An ordinary, singularly-linked list an easily and efficiently be used for a stack.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 9
/ 1.5 pts

Additional Comments:

UnansweredQuestion 10

Correct Answer

True

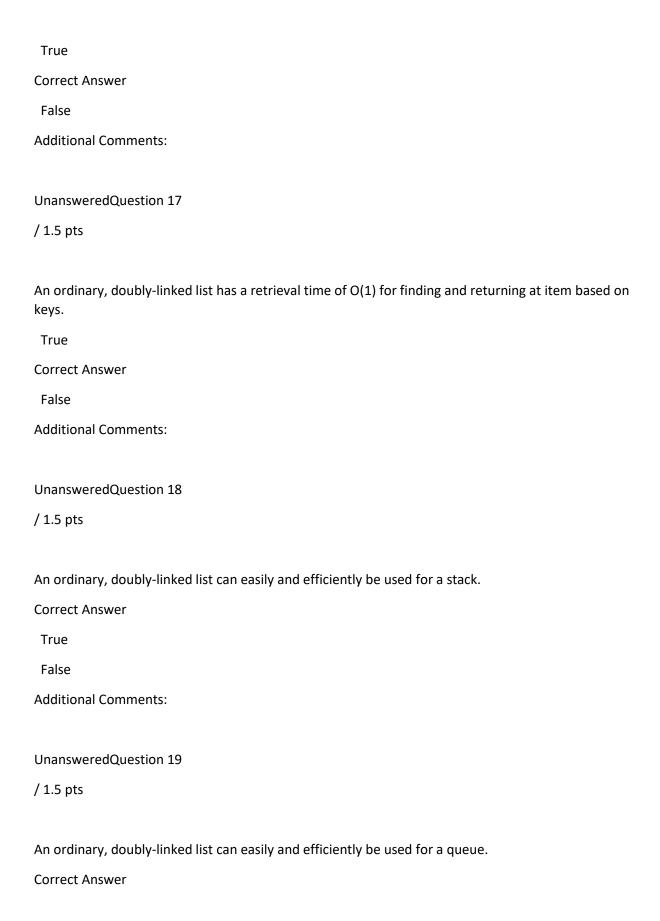
False

/ 1.5 pts

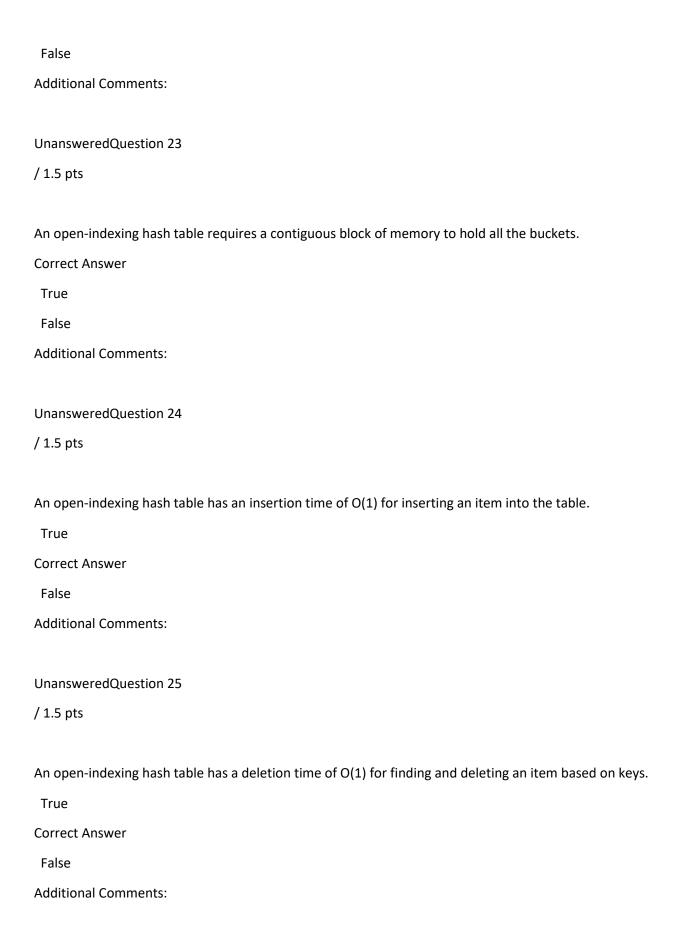
An ordinary, singularly-linked list can be created (empty) in O(1) time.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 11
/ 1.5 pts
An ordinary, doubly-linked list can be traversed forward or backward.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 12
/ 1.5 pts
An ordinary, doubly-linked list allows individual links to be placed in any available place in the heap (free store).
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 13
/ 1.5 pts

An ordinary, doubly-linked list requires a contiguous block of memory to hold all the links.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 14
/ 1.5 pts
An ordinary, doubly-linked list has an insertion time of O(1) for inserting an item into the list.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 15
/ 1.5 pts
An ordinary, doubly-linked list has a deletion time of O(1) for finding and deleting an item based on keys.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 16
/ 1.5 pts
An ordinary, doubly-linked list has a replacement time of O(1) for finding and replacing an item based on

keys.







UnansweredQuestion 26
/ 1.5 pts
An open-indexing hash table has a replacement time of O(1) for finding and replacing an item based on keys.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 27
/ 1.5 pts
An open-indexing hash table has a retrieval time of O(1) for finding and returning at item based on keys.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 28
/ 1.5 pts
An open-indexing hash table can easily and efficiently be used for a stack.
True
Correct Answer
False
Additional Comments:

UnansweredQuestion 29
/ 1.5 pts
An open-indexing hash table can easily and efficiently be used for a queue.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 30
/ 1.5 pts
An open-indexing hash table can be created (empty) in O(1) time.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 31
/ 1.5 pts
It usually takes fewer steps to insert an item in a hash table than in a linked list, as the number of items already contained in the data structure becomes large.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 32

/	1	.5	D.	ts

Question 35

It usually takes fewer steps to find a specific item in a hash table than in a linked list, as the number of items already contained in the data structure becomes large.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 33
/ 1.5 pts
It usually takes fewer steps to insert an item in a hash table than in an array, as the number of items already contained in the data structure becomes large.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 34
/ 1.5 pts
It usually takes fewer steps to find a specific item in a hash table than in an array, as the number of items already contained in the data structure becomes large.
Correct Answer
True
False
Additional Comments:

/ 10 pts

Hashing

Given the following items to insert into a hash table of size 10, fill in the blanks/buckets in the table to show the hash table after all items have been inserted. If a blank/bucket should have no item in it after all items have been inserted into the table, put the word "none" in that location in the table.

The items are to be inserted starting from the top of the list and working down.

The primary hash function is key modulus table_size.

The collision resolution strategy is double hashing.

The secondary hash function is key div table_size, where div is integer division (that is, division discarding the remainder).

Items to insert

Item	Hash Code
Α	54
В	43
С	28
D	60
Е	33
F	79
G	81
Н	41
l	88
J	67

Bucket Number	Item
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
Answer 1:	
You Answered (You left	this blank)
Correct Answer	
D	
Correct Answer	
60	
Correct Answer	
d	
Answer 2:	
You Answered (You left	this blank)
Correct Answer	

G

Correct Answer
81
Correct Answer
g
Answer 3:
You Answered (You left this blank)
Correct Answer
I
Correct Answer
88
Correct Answer
i
Answer 4:
You Answered (You left this blank)
Correct Answer
В
Correct Answer
43
Correct Answer
b
Answer 5:
You Answered (You left this blank)
Correct Answer
Α
Correct Answer
54
Correct Answer
a
Answer 6:

```
You Answered (You left this blank)
Correct Answer
Correct Answer
41
Correct Answer
h
Answer 7:
You Answered (You left this blank)
Correct Answer
Ε
Correct Answer
33
Correct Answer
e
Answer 8:
You Answered (You left this blank)
Correct Answer
J
Correct Answer
67
Correct Answer
j
Answer 9:
You Answered (You left this blank)
Correct Answer
C
Correct Answer
```

Correct Answer
c
Answer 10:
You Answered (You left this blank)
Correct Answer
F
Correct Answer
79
Correct Answer
f
Additional Comments:
Question 36
/ 20 pts
Linear Hashing
Given the following items to insert into a hash table that uses linear hashing, fill in the blanks/buckets
the table to show the hash table after all items have been inserted. To show how large the hash table

Given the following items to insert into a hash table that uses linear hashing, fill in the blanks/buckets in the table to show the hash table after all items have been inserted. To show how large the hash table has grown, only put bucket numbers in the blanks for the rows used in the table. For the remaining blanks, put the word "none" in place of the bucket number. Similarly, if a bucket or separate chain link should have no item in it after all items have been inserted into the table, put the word "none" in that location in the table.

The items are to be inserted starting from the top of the list and working down.

The collision resolution strategy is separate chaining.

Be sure to treat and write the hash codes and bucket numbers as binary numbers as shown in the 2018 slides.

Items to insert

Item Hash Code

Α	0010
В	1001
С	0000
D	1110
Ε	1000
F	0011
G	1100
Н	1100

1101

1111

Hash table (with additional columns to represent where links for separate chaining would connect)

Bucket Number Item Link1 Link2

Answer 1:

You Answered (You left this blank)

Correct Answer
000
Answer 2:
You Answered (You left this blank)
Correct Answer
С
Correct Answer
С
Correct Answer
0000
Answer 3:
You Answered (You left this blank)
Correct Answer
E
Correct Answer
e
Correct Answer
1000
Answer 4:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 5:

You Answered (You left this blank)
Correct Answer
001
Answer 6:
You Answered (You left this blank)
Correct Answer
В
Correct Answer
b
Correct Answer
1001
Answer 7:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 8:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"

Correct Answer
'None"
Answer 9:
ou Answered (You left this blank)
Correct Answer
010
Answer 10:
ou Answered (You left this blank)
Correct Answer
A
Correct Answer
9
Correct Answer
0010
Answer 11:
ou Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"
Correct Answer
'None"
Answer 12:
ou Answered (You left this blank)
Correct Answer
none

```
None
Correct Answer
"none"
Correct Answer
"None"
Answer 13:
You Answered (You left this blank)
Correct Answer
11
Answer 14:
You Answered (You left this blank)
Correct Answer
Correct Answer
Correct Answer
0011
Answer 15:
You Answered (You left this blank)
Correct Answer
Correct Answer
i
Correct Answer
1011
Answer 16:
You Answered (You left this blank)
Correct Answer
none
```

Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 17:
You Answered (You left this blank)
Correct Answer
100
Answer 18:
You Answered (You left this blank)
Correct Answer
G
Correct Answer
g
Correct Answer
1100
Answer 19:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"

Answer 20:

You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 21:
You Answered (You left this blank)
Correct Answer
101
Answer 22:
You Answered (You left this blank)
Correct Answer
Н
Correct Answer
h
Correct Answer
1101
Answer 23:
You Answered (You left this blank)
Correct Answer
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Correct Answer
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Correct Answer
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Correct Answer
'None"
Answer 24:
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Correct Answer
none
Correct Answer
None
Correct Answer
'none"
Correct Answer
'None"
Answer 25:
You Answered (You left this blank)
Correct Answer
110
Answer 26:
You Answered (You left this blank)
Correct Answer
D
Correct Answer
d
Correct Answer
1110
Answer 27:
You Answered (You left this blank)
Correct Answer
none

```
None
Correct Answer
"none"
Correct Answer
"None"
Answer 28:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 29:
You Answered (You left this blank)
Correct Answer
111
Answer 30:
You Answered (You left this blank)
Correct Answer
J
Correct Answer
j
Correct Answer
1111
Answer 31:
You Answered (You left this blank)
```

Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 32:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
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Correct Answer
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Answer 33:
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Correct Answer
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Correct Answer
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Answer 35:
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Correct Answer
none
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Correct Answer
"none"
Correct Answer
"None"
Answer 36:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"

Answer 37:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"
Correct Answer
'None"
Answer 38:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"
Correct Answer
'None"
Answer 39:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"

```
"None"
Answer 40:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Additional Comments:
Question 37
/ 30 pts
Radix Sort
// Radixsort takes:
// A: the array to sort
// r: the radix (base) for the keys to be sorted
// d: the number of digits (of the given radix) in each key
Algorithm Radixsort (A, r, d)
 create Q[r]//Q is an array of r queues, all initially empty
 for k from 0 to d-1
  for i from 0 to A.size
   Q[(A[i].key/(r to the power k)) modulus r].enqueue(A[i])
  end for i
  i \leftarrow 0
```

```
for j from 0 to r do

while Q[j] is not empty

A[i] \leftarrow Q[j].dequeue()

i \leftarrow i + 1

end while

end for j
```

Given r is 10 and d is 2, show the steps followed by the Radix Sort algorithm given above in pseudocode when sorting the following array. Fill in the values in the figures for Q and A for each value of k. All empty locations should be marked "none" in these figures.

A (initially):

index 0 2 5 7 3 6 9 value 28 52 22 90 60 84 55 75 61 4

Q (when k = 0):

value at head

value at next

A (when k = 0):

index 0 1 2 3 4 5 6 7 8 9

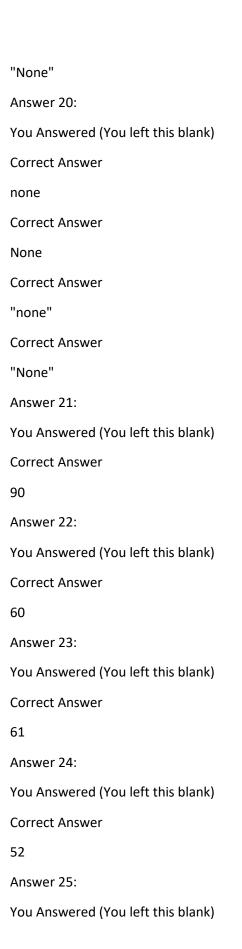
value

Q (when k = 1): index 0 1 2 3 5 6 7 9 value at head value at next A (when k = 1): index 0 1 2 3 5 6 7 8 9 value Answer 1: You Answered (You left this blank) **Correct Answer** 90 Answer 2: You Answered (You left this blank) **Correct Answer** 61 Answer 3: You Answered (You left this blank) **Correct Answer** 52 Answer 4: You Answered (You left this blank) **Correct Answer**

none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 5:
You Answered (You left this blank)
Correct Answer
84
Answer 6:
You Answered (You left this blank)
Correct Answer
75
Answer 7:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 8:
You Answered (You left this blank)
Correct Answer
none

None
Correct Answer
"none"
Correct Answer
"None"
Answer 13:
You Answered (You left this blank)
Correct Answer
22
Answer 14:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 15:
You Answered (You left this blank)
Correct Answer
4
Correct Answer
04
Answer 16:
You Answered (You left this blank)
Correct Answer

Answer 17:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"
Correct Answer
'None"
Answer 18:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
'None"
Answer 19:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
'none"



Correct Answer
22
Answer 26:
You Answered (You left this blank)
Correct Answer
84
Answer 27:
You Answered (You left this blank)
Correct Answer
75
Answer 28:
You Answered (You left this blank)
Correct Answer
55
Answer 29:
You Answered (You left this blank)
Correct Answer
28
Answer 30:
You Answered (You left this blank)
Correct Answer
4
Correct Answer
04
Answer 31:
You Answered (You left this blank)
Correct Answer
4

none

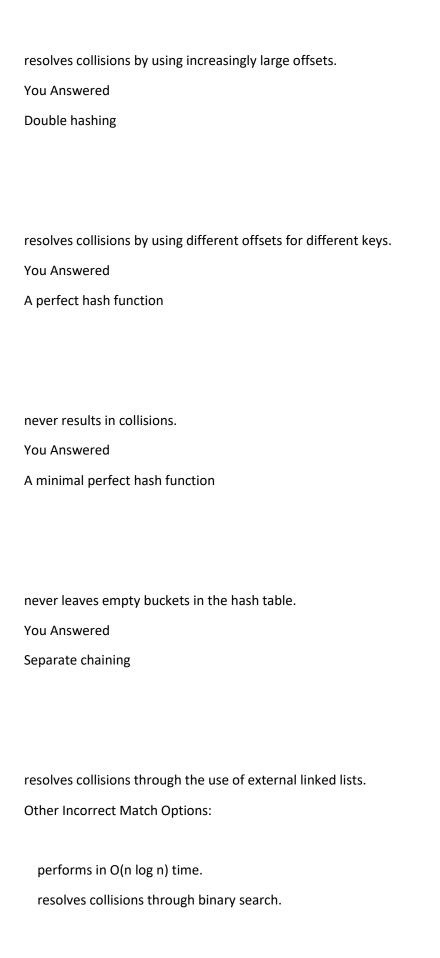
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 42:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 43:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 44:
You Answered (You left this blank)

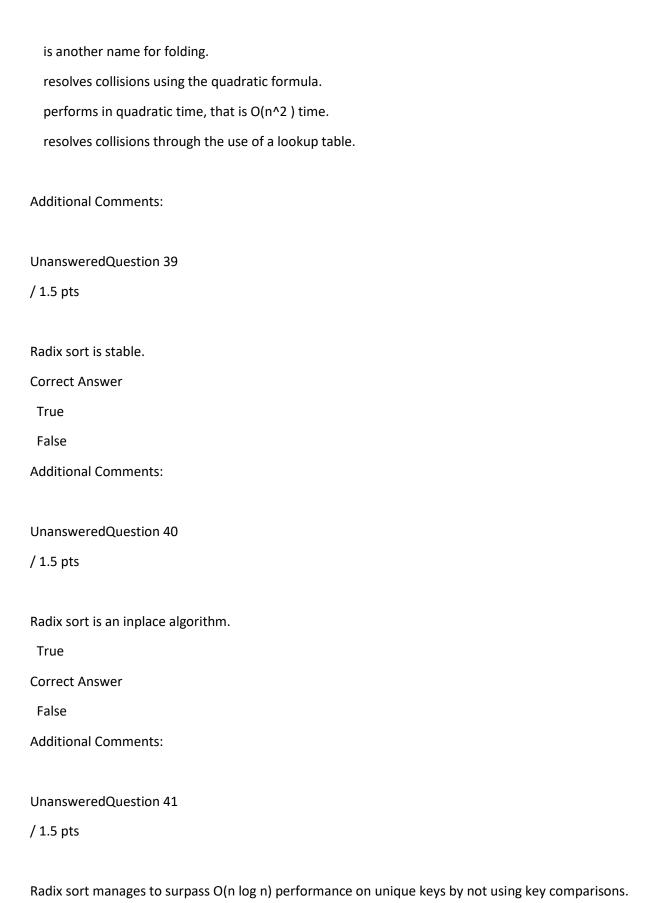
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 45:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 46:
You Answered (You left this blank)
Correct Answer
52
Answer 47:
You Answered (You left this blank)
Correct Answer
61
Answer 48:
You Answered (You left this blank)

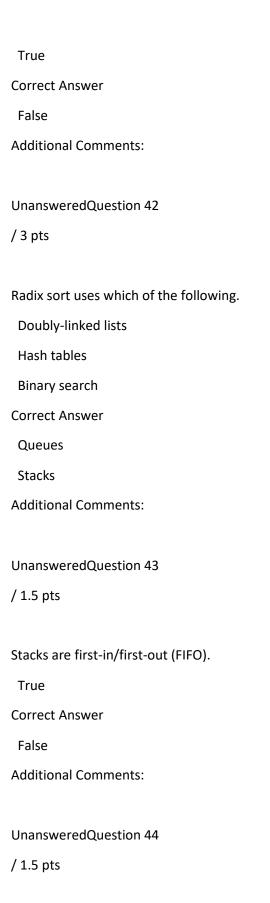
none
Correct Answer
None
Correct Answer
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Correct Answer
"None"
Answer 49:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 50:
You Answered (You left this blank)
Correct Answer
none
Correct Answer
None
Correct Answer
"none"
Correct Answer
"None"
Answer 51:
You Answered (You left this blank)

Correct Answer
4
Correct Answer
04
Answer 52:
You Answered (You left this blank)
Correct Answer
22
Answer 53:
You Answered (You left this blank)
Correct Answer
28
Answer 54:
You Answered (You left this blank)
Correct Answer
52
Answer 55:
You Answered (You left this blank)
Correct Answer
55
Answer 56:
You Answered (You left this blank)
Correct Answer
60
Answer 57:
You Answered (You left this blank)
Correct Answer
61
Answer 58:

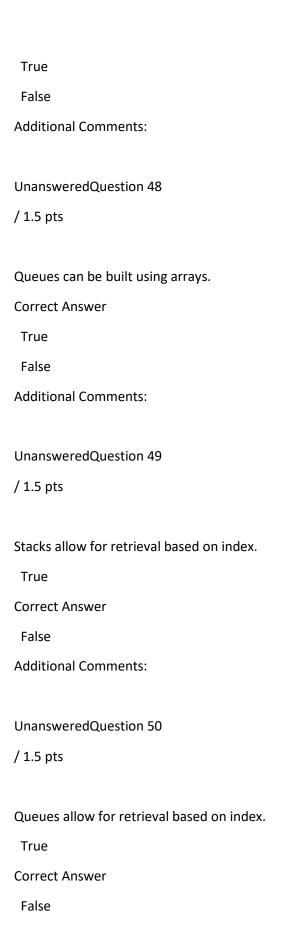
You Answered (You left this blank)
Correct Answer
75
Answer 59:
You Answered (You left this blank)
Correct Answer
84
Answer 60:
You Answered (You left this blank)
Correct Answer
90
Additional Comments:
Question 38
/ 6 pts
Match each term to a statement that is true for it. (Note that there are more statements than terms, so some statements will go unmatched.)
You Answered
Linear probing
resolves collisions by searching linearly through the hash table for an open bucket.
You Answered
Quadratic probing



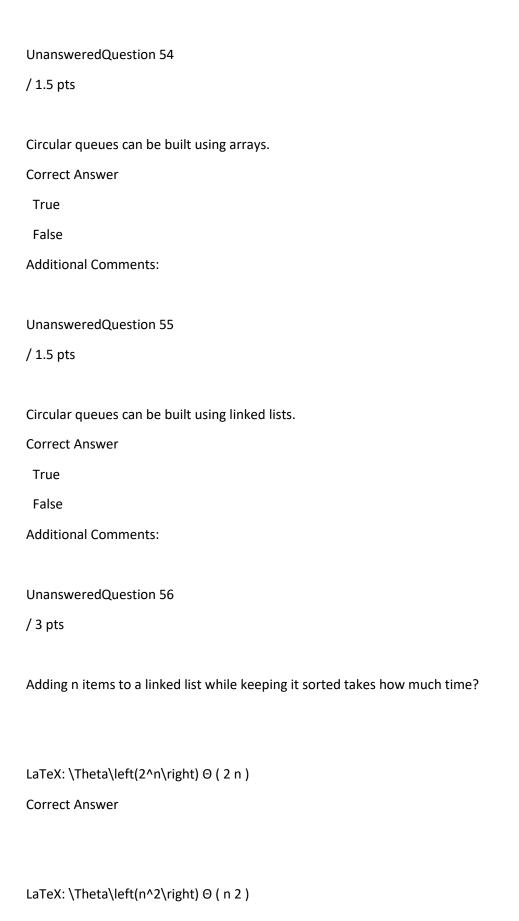


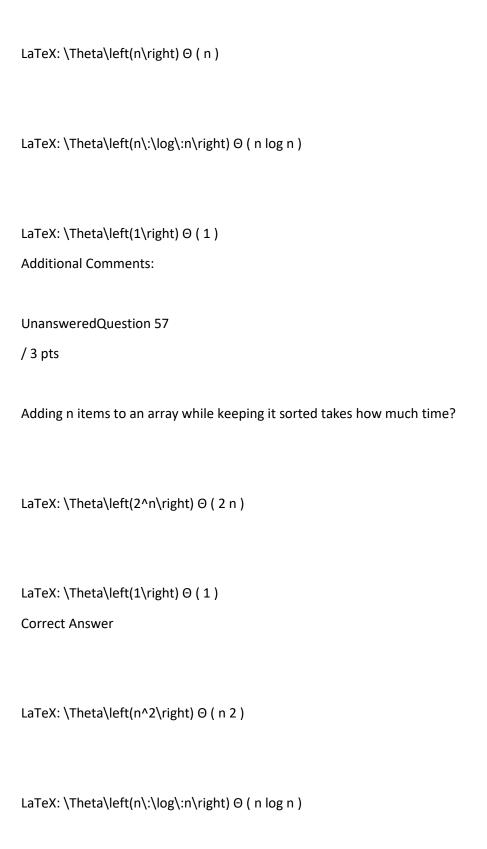


Queues are first-in/last-out (FILO).
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 45
/ 1.5 pts
, 1.5 pts
Stacks can be built using linked lists.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 46
/ 1.5 pts
Queues can be built using linked lists.
Correct Answer
True
False
Additional Comments:
UnansweredQuestion 47
/ 1.5 pts
Stacks can be built using arrays.
Correct Answer



Additional Comments:
UnansweredQuestion 51
/ 1.5 pts
Primary clustering is a result of using prime numbers as hash table sizes.
True
Correct Answer
False
Additional Comments:
UnansweredQuestion 52
/ 1.5 pts
One advantage of using modulus arithmetic as a hash function is that it is fast to compute.
Correct Answer
True False
Additional Comments:
UnansweredQuestion 53
/ 1.5 pts
Bucket search is the method used to find items in hash tables. True
Correct Answer
False
Additional Comments:





LaTeX: $\Theta\left(\left(n\right) \Theta \right)$ (n)

Additional Comments: