Question 1

5 / 5 pts

The study of algorithms is known as _____.

- algorithm studies
- algorithm analysis
- **algorithmics**
- algorithm science
- algoanalysis
- algorithmology

Question 2

10 / 10 pts

The following is the list of Big-O categories.

Letter	Category
a	O(1)
b	$O(n^2)$
c	O(log n)
d	O(n)
e	O(n log n)

What is is the correct order of these from **best to worst**? Place the single letters (from the table above) below.

a Best

c

d

e

b Worst

Answer 1:

a

Answer 2:

c

Answer 3:

d

Answer 4:

e

Answer 5:

b

Question 3

20 / 20 pts

Match the definition to its word. There will be some words left over.

Used to store dynamically declared objects.	system heap
Algorithm that converts infix to postfix	shunting yard
When a function calls another, this is placed on the system stack.	activation record
When a function is running with data it is a/an _____ of that function.	instance
This term refers to how the data is being stored.	data structure
When an array as a fixed size, this is to refered to as _____.	capacity
When you write a class, the public functions (and attributes) define the _____.	interface
An expression that contains no precedence levels and has all the required parathesis.	full parenthesized expression
When an array is sorted, this algorithm finds the data with incredible speed	binary search
Sorting attribute where "equal" items do not change relative positions.	stable

Question 5

10 / 10 pts

Do the first pass of a Radix Sort on the following array. The first row contains the array indexes.

0	1	2	3	4	5	6	7	8	9
125	232	654	912	442	443	991	231	906	123

After the first pass, what is the value of Array[2]?

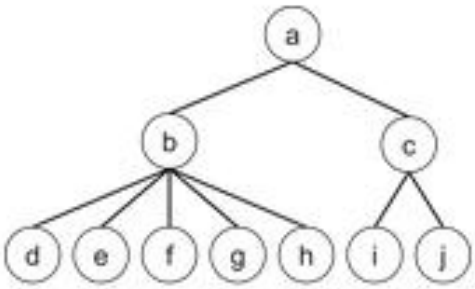
232

Partial

Question 6

12 / 15 pts

For the following tree, please fill in the attributes below.



Enter numeric values (*e.g. 2*)

Depth: 2

Branching Factor: 9

Size: 10

Enter the letter of the node in lowercase (*e.g. n*)

Parent of j: c

Grandparent of j: a

Answer 1:

2

Answer 2:

9

Answer 3:

10

Answer 4:

c

Answer 5:

a

Incorrect

Question 7

0 / 5 pts

What is the auxiliary storage requirements of Quick Sort?

- (selected) O(log n)
- O(n log n)
- $O(n^2)$
- O(n)
- $O(2^n)$
- $O(n^{1/2})$
- $O(n^{1/3})$
- $O(n^3)$
- O(1)

Question 8

5 / 5 pts

What is the auxiliary storage requirements of Merge Sort?

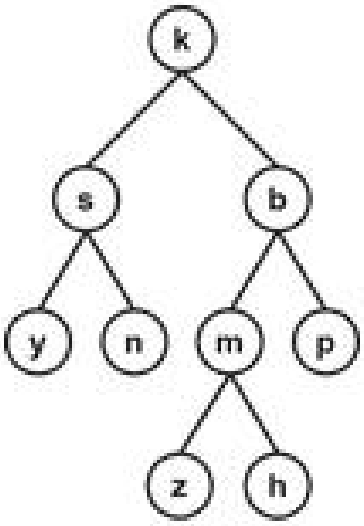
- $O(n^{1/2})$
- O(log n)
- $O(2^n)$
- (selected) O(n)
- O(1)
- $O(n^2)$
- $O(n^{1/3})$
- $O(n^3)$
- O(n log n)

Question 9

10 / 10 pts

For the following tree, write down the order in which the nodes will be visited in **post-order**.

Type your answer in lowercase, without any spaces. *Example: abcdef*



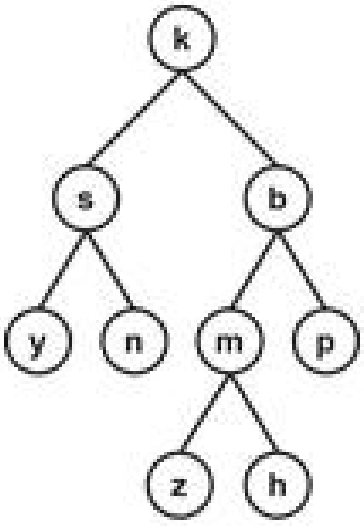
ynszhmpbk

Question 10

10 / 10 pts

For the following tree, write down the order in which the nodes will be visited in **pre-order**.

Type your answer in lowercase, without any spaces. *Example: abcdef*



ksynbmzhp

Incorrect

Question 11

0 / 10 pts

What is the result of the following prefix expression?

* 5 + 10 2

52

Question 12

10 / 10 pts

Which of the following operations are in the interface of a Stack?

Add to the front of the list: [Select]

Add to the end of the list: no

Add (can be put anywhere): [Select]

Remove from the front of the list: [Select]

Remove from the end of the list : no

Answer 1:

yes

Answer 2:

no

Answer 3:

no

Answer 4:

yes

Answer 5:

no

Question 14

10 / 10 pts

Which of the following are specified by an abstract data type?

```
(a) the Big-O classification
(b) the different operations on the data
(c) the underlying data structure
(d) usage of the system stack and heap
(e) the errors that can occur
(f) the type of data being stored
```

- ○ all of these
- ○ c, f
- ○ a,b,c,d
- ○ a, c
- ○ a, d, e
- ○ a, c, d
- ◉ b, e, f
- ○ c, d, f

Question 15

10 / 10 pts

Most programming languages today (especially the object-oriented ones) are reference languages.

Answer 1:

reference

Incorrect

Question 17

0 / 10 pts

Do the first pass of a QuickSort on the following array. The first row is the array indexes. Assume the pivot is the first item.

0	1	2	3	4	5	6	7
45	23	52	65	89	35	12	30

After the first pass, what is the value of Array[0]?

45

Question 18

10 / 10 pts

What is the result of the following postfix expression?

```
20 6 4 - / 4 3 * +
```

22

Question 19

5 / 5 pts

What is the Big-O requirement of adding an item to a dynamic array?

- ○ O(1)
- ○ O(log n)
- ○ $O(2^n)$
- ○ $O(n^{5/4})$
- ○ $O(n^n)$
- ○ $O(n^{3/2})$
- ◉ **O(n)**
- ○ O(n log n)
- ○ $O(n^2)$

Question 20

5 / 5 pts

What is time requirement of adding at node to the end of a linked list (without a tail node)?

- ○ O(n log n)
- ◉ **O(n)**
- ○ O(1)
- ○ $O(n^2)$
- ○ O(log n)
- ○ $O(2^n)$

Question 21

5 / 5 pts

When an instance of an object is still linked, but won't ever be used by the program again, it is called this.

- (●) loitering
- ( ) leak
- ( ) persistant
- ( ) squatting
- ( ) access
- ( ) heap

Question 22

5 / 5 pts

To get a rough idea how long an algorithm will run, you can multiply the total times the _____ is executed by how it takes to be executed.

- ( ) essential operation
- ( ) essential time unit
- ( ) clock
- ( ) primary operation
- (●) basic operation
- ( ) primary clock

Question 23

5 / 5 pts

What is the Big-O classification for the RemoveLast() on a Deque using a singly-linked list?

- O(2^n)
- O(log n)
- **O(n)**
- O(n log n)
- O(n^2)
- O($n^{3/2}$)
- O(n^n)
- O(1)
- O($n^{5/4}$)

Question 24

5 / 5 pts

What is the average-case time complexity of Shell Sort?

- O(n log n)
- O(1)
- O(n^n)
- O(n)
- O($n^{3/2}$)
- O(n^2)
- O(log n)
- O(2^n)
- **O($n^{5/4}$)**

Question 25

5 / 5 pts

What is the best-case time complexity of Insertion Sort?

- $O(2^n)$
- **$O(n)$**
- $O(n \log n)$
- $O(n^2)$
- $O(\log n)$
- $O(1)$
- $O(n^{5/4})$
- $O(n^{3/2})$
- $O(n^n)$

Question 26

5 / 5 pts

What is the worse-case time complexity of Quick Sort?

- $O(\log n)$
- $O(1)$
- $O(n^{5/4})$
- **$O(n^2)$**
- $O(n^{3/2})$
- $O(n)$
- $O(n \log n)$
- $O(n^n)$
- $O(2^n)$

Question 27

10 / 10 pts

The following program makes use of a deque. Assume the queue is empty at the beginning. What will be the output?

```
deque.addFirst(86);
deque.addFirst(47);
deque.addLast(24);
deque.removeFirst();
deque.addFirst(42);
deque.removeLast();
deque.addLast(12);

while ( ! deque.isEmpty())
{
   System.out.print(deque.removeFirst());
}
```

Please enter the values separated by a single space. Don't use commas. Don't use multiple spaces.

42 86 12