Pre-Assessment - Data Structures and Algorithms I (GJO1) PGJO

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Attempt #1
Status: Passed

1.

Which statement describes a queue data structure?

	Your Answer	Correct Answer
It is a sequence of elements in which insertion and deletion takes place at one end.		
It is a sequence of elements in which insertion and deletion takes place at both ends.		
It is a sequence of elements in which insertion can take place anywhere in the sequence and deletion takes place only at the front.		
It is a sequence of elements in which insertions can take place only at the back end and deletions can take place only at the front end.	✔	✔

2.

Which data structure allows inserting and deleting data elements at both the front and the rear?

	Your Answer	Correct Answer
Trees		
Deques	✔	✔
Stacks		
Queues		

3.

Which data structure allows elements to be inserted and deleted from one end and provides no direct access to the other end?

	Your Answer	Correct Answer
List		
Deque		
Stack	✔	✔
Queue		

4.

What are the official indexes for the list list01 given this declaration?

```
int[ ] list01 = {0, 2, 4, 6, 8, 10};
```

	Your Answer	Correct Answer
0, 1, 2, 3, 4, 5	✔	✔
0, 2, 4, 6, 8, 10		
1, 2, 3, 4, 5, 6		
2, 4, 6, 8, 10, 12		

5.

Which abstract data type (ADT) has elements of the same type so that the elements can be retrieved based on the index or position?

	Your Answer	Correct Answer
List	✔	✔
Bag		
Stack		

	Your Answer	Correct Answer
Queue		

6.

Which data structure allows insertion and removal from only one end of the data structure?

	Your Answer	Correct Answer
List		
Queue		
Stack	✔	✔
Deque		

7.

Which data type does the mystery function return?

```
return_type mystery (int R)

 {
int NumUnits = R;
return NumUnits * 3.14;
}
```

	Your Answer	Correct Answer
Byte		
String		
Double	✔	✔
Boolean		

8.

Which category of data does ("FB", 75.00, 75.03, 74.90) represent in the pseudocode?

```
import datetime
def middle(stock, date):
    symbol, current, high, low = stock
    return (((high + low) / 2), date)

 mid_value, date = middle(("FB", 75.00, 75.03, 74.90),
       datetime.date(2014, 10, 31))
```

	Your Answer	Correct Answer
List		
Float		
Tuple	✔	✔
Operator		

9.

Which value is appropriate for Test1 given the expression?

```
char Test1;
```

	Your Answer	Correct Answer
'L'	✔	✔
77		
6.5		
"value"		

10.

Which value is appropriate for the variable middle given the pseudocode?

```
 function mystery()
{
   string last;
   string first;
   char middle;
   int phone;
   float rate;
}
```

	Your Answer	Correct Answer
'D'	✔	✔
'Da'		
"david"		
"David"		

11.

Which type of operation is represented in the pseudocode?

```
 int x,y,z;
x=y=z=100;
```

	Your Answer	Correct Answer
Ternary		
Assignment	✔	✔
Comparison		
Equality		

12.

What is the most efficient data type to use for this data set of a fixed size in Java?

a = [0, 0, 1, 4, 7, 16, 31, 64, 127]

	Your Answer	Correct Answer
List		
Tuple		
Array	✔	✔
Dictionary		

13.

Which data type is appropriate for this array to store the given data?

a = ["AF", "71", "BC", "157", "BA", "253"]

	Your Answer	Correct Answer
Byte		
Char		
Short		
String	✔	✔

14.

Which data type is appropriate for the given data set?

a = [1, 717, 23, 12, 314, 6]

	Your Answer	Correct Answer
Int	✔	✔
Byte		
Char		
Boolean		

15.

Which data type should be used for this object?

days = { "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"}

	Your Answer	Correct Answer
Float		
String	✔	✔
Integer		
Boolean		

16.

Which data type should be used for this variable?

phoneNum = "212-555-1212"

	Your Answer	Correct Answer
Long		
Short		
String	✔	✔
Integer		

17.

What is true about garbage collection?

	Your Answer	Correct Answer
It is often portrayed as the same as manual memory management.		
It is no longer a primary concern since memory is very inexpensive.		

	Your Answer	Correct Answer
It is scheduled to take place at regular time intervals to reclaim memory.		
It reclaims memory from data structures implemented using linked allocations.	✔	✔

18.

What is true about a data structure implemented using linked allocation?

	Your Answer	Correct Answer
Elements may not be added once the data structure is filled.		
Storage is allocated using pointers to new locations as needed.	✔	✔
The amount of memory used is no greater than a sequential allocation version.		
An empty structure uses more memory compared to a version using sequential allocation.		

19.

What are the array elements corresponding to the mid-values in the first and second iterations of a binary search in an array arr = {45, 77, 89, 90, 94, 99, 100} and key = 100?

	Your Answer	Correct Answer
89 and 94		
90 and 99	✔	✔
94 and 99		
90 and 100		

20.

What is the effect on the object Computing regarding garbage collection?

Computing obj = new Computing(); obj = null;

	Your Answer	Correct Answer
It is partially available for garbage collection.		
It is automatically available for garbage collection.	✔	✔
It is a Computing object that is already null, which does not require garbage collection.		
It is a Computing constructor that has no parameters, and is not available for garbage collection.		

21.

What are the mid-values in the first and second levels of recursion in this binary search?

int arr = {46, 76, 89, 90, 94, 99, 100} and key = 99

	Your Answer	Correct Answer
89 and 94		
89 and 99		
90 and 94		
90 and 99	✔	✔

22.

Which data set is represented using the dictionary data type?

	Your Answer	Correct Answer
A set of book titles		
A set of Celsius temperatures		
A set of soda cans in a refrigerator		
A set of students and their test scores	✔	✔

23.

What is a characteristic of keys in an associative dictionary data type?

	Your Answer	Correct Answer
They are unique and mutable.		
They are unique and immutable.	✔	✔
They are non-unique and mutable.		
They are non-unique and immutable.		

24.

Which method can be used to take a value out of a dictionary?

	Your Answer	Correct Answer
D1[key].pop(value)		
D1[key].pull(value)	✔	
D1[key].delete(value)		
D1[key].remove(value)		✔

25.

Given this data dictionary in Python:

dict = {'white':0x0000, 'black':0x1111}

Which command/function generates the output ['white','black']?

	Your Answer	Correct Answer
dict_keys()		
keys_values()		

	Your Answer	Correct Answer
dict.keys()	✔	✔
keys.values()		

 26.

The reference of the head of the doubly linked list is passed to the reverse() method:

1<-->2<-->3<-->4<-->5<-->6

What is the modified linked list when complete?

	Your Answer	Correct Answer
2<-->1<-->4<-->3<-->6<-->5		
5<-->4<-->3<-->2<-->1<-->6		
6<-->5<-->4<-->3<-->2<-->1	✔	✔
6<-->5<-->4<-->3<-->1<-->2		

 27.

Which data structure is indexed?

	Your Answer	Correct Answer
Heap		
Array	✔	✔
Linked list		
Directed graph		

 28.

Which data structure may only store homogeneous data elements?

	Your Answer	Correct Answer
Arrays	✔	✔
Classes		
Dictionaries		
Linked lists		

29.

What is a hierarchical data structure?

	Your Answer	Correct Answer
List		
Tree	✔	✔
Array		
Linked list		

30.

What is an attribute of a binary tree?

	Your Answer	Correct Answer
Each node has at most two children.	✔	✔
The root node is empty in a full tree.		
The leftmost child is null in a full tree.		
The rightmost child is null in a full tree.		

31.

Which data structure uses a last in, first out (LIFO) removal of items?

	Your Answer	Correct Answer
Tree		
Queue		
Stack	✔	✔
Dictionary		

32.

Given:

heapList = [22, 33, 44, 55, 66]

Which index is the right child of item 22?

	Your Answer	Correct Answer
33	✔	
44		✔
55		
66		

33.

Items were added sequentially in this stack starting with 'ham': '

sausage'
'toast'
'eggs'
'ham'

What is the correct order of contents after the push operation is performed with the value 'bacon'?

	Your Answer	Correct Answer
'bacon' 'sausage' 'toast' 'eggs' 'ham'		✔
'sausage' 'toast' 'eggs' 'ham' 'bacon'	✔	
'sausage' 'toast' 'eggs' 'bacon' 'ham'		
'sausage' 'bacon' 'toast' 'eggs' 'ham'		

34.

Items were added sequentially in this stack starting with "dog":

"bird"
"rabbit"
"cat"
"dog"

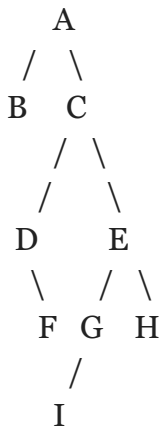
What is the return value of the pop operation?

	Your Answer	Correct Answer
"dog"		
"cat"		
"rabbit"		

	Your Answer	Correct Answer
"bird"	✔	✔

35.

Which sequence of letters represents preorder traversal of the nodes of this tree?



	Your Answer	Correct Answer
A B C D E F G H I		
A B C D F E G I H	✔	✔
B A D F C I G E H		
B F D I G H E C A		

36.

An array soc of size 1009 is used where the index is an integer in [0,1008] and the hash-function key%1009.

Where will the data associated with the key given by the last 4 social security digits '2023' be stored?

	Your Answer	Correct Answer
In soc[4]		

	Your Answer	Correct Answer
In soc[5]	✔	✔
In soc[1009]		
In soc[2023]		

 37.

A stack s, a queue q, and a max value priority queue p each have a single 3 in them. Next s.push(4), q.push(4), and p.push(4) are executed.

What is the triple (s.pop(), q.pop(), p.pop())?

	Your Answer	Correct Answer
(3,4,4)		
(4,3,3)	✔	
(4,3,4)		✔
(4,4,3)		

 38.

This stack reads left to right with the top to the right:

'green'
'yellow'
'blue'
'red'

What could be the stack after a push operation?

	Your Answer	Correct Answer
['red','blue','yellow']		

	Your Answer	Correct Answer
['blue','yellow', 'green']		
['red','blue','yellow', 'green', 'purple"]	✔	✔
['purple', 'red','blue','yellow', 'green']		

 39.

Items were added sequentially onto the stack starting with 'red':

'green'
'yellow'
'blue'
'red'

What is the stack after a pop operation?

	Your Answer	Correct Answer
'yellow' 'blue' 'red'	✔	✔
'green' 'yellow' 'blue'		
'purple' 'green' 'yellow' 'blue' 'red'		
'green' 'yellow' 'blue' 'red' 'purple'		

 40.

Which command helps to speed up comparisons using dictionary keys during a dictionary (d) lookup in this pseudocode clip?

```
 h = hash(key)
for pair in d:
  if h == pair[0]:
    return pair[1]
```

	Your Answer	Correct Answer
0(1)		
pair[0]		
pair[1]		
hash(object)	✔	✔

41.

What does the method any(b) return in Python if b is a dictionary?

	Your Answer	Correct Answer
Returns False if the dictionary is empty.	✔	
Method any() does not exist for the dictionary.		
Returns True if any key of the dictionary is true.		✔
Returns True if all keys of the dictionary are true.		

42.

Which Java method is used to read bytes from a standard file?

	Your Answer	Correct Answer
Java.mp.In		
Java.io.StdArrayIO		
Java.lang.BinaryStdIn		

	Your Answer	Correct Answer
Java.io.FileInputStream	✔	✔

43.

Which command will retrieve an item from the top of the stack?

	Your Answer	Correct Answer
Pop()	✔	✔
Deque()		
Hash ()		
Append()		

44.

Which command will insert object x at position index in a list?

	Your Answer	Correct Answer
Get(int index)		
Remove(int index)		
Add(int index, Object x)	✔	✔
Set(int index, Object x)		

45.

Which command will return true if x is in a list, otherwise return false?

	Your Answer	Correct Answer
IndexOf(Object x)		
Remove(Object x)		

	Your Answer	Correct Answer
Contains(Object x)	✔	✔
Set(int index, Object x)		

46.

When should a dictionary be used instead of a list?

	Your Answer	Correct Answer
When the program only uses strings		
When the program uses key-value pairs as its data	✔	✔
When the programmer needs to delete some of its data items		
When the program needs to quickly modify the contents of its data structures		

47.

What is the logical first step in an algorithm that extracts all the positive values from a given list of numbers?

	Your Answer	Correct Answer
Initialize the result to 0		
Set the current number to 0		
Initialize the result to an empty list	✔	✔
Check that the given list contains at least one number		

48.

What is displayed when n = 2 in this pseudocode?

```
 for(int i = 2; i <= n; i++){
for(j = 0; j <= n;){
```

```
    display j;
    j = j + n/2; the division is integer division, decimal part neglected
}
}
```

	Your Answer	Correct Answer
0, 1, 2	✔	✔
1, 0, 2		
1, 2, 0		
0, 2, 1		

49.

Given a set of numeric data and two declared variables: small and max, what is the logical first step in an algorithm that finds the smallest number?

	Your Answer	Correct Answer
Declaring a variable for small		
Setting the variable equal to zero		
Determining the maximum number		
Checking that the list contains at least one number	✔	✔

50.

What is the logical last step in an algorithm that averages the high temperatures for 10 days and displays the average high temperature?

	Your Answer	Correct Answer
Printing the temperature	✔	✔
Declaring the variable temperature		
Computing the average high temperature		
Conditionally accepting the average high temperature		

51.

What is the output of the pseudocode below if the variables declared in the main program are global?

```
Main
    Declare X as Integer, Y as Integer
    Set X = 1
    Set Y = 2
    Call Sub(X, Y)
    Write X
    Write Y
End Program

Subprogram Sub(Integer Num1, Integer Num2 as Reference)
    Declare X as Integer
    Set Num1 = 3
    Set Num2 = 4
    Set X = 5
    Write X
End Subprogram
```

	Your Answer	Correct Answer
5 34		
5 14	✔	✔
5 24		

52.

How many times in this pseudocode is the function F called?

```
Main
   Declare K as Integer
   K = 3
   Set Result = F(K)
   Write Result
End Program

 Function F(N) as Integer
      If N == 1 Then
Set F = 1
   Else
      Set F = N * F(N - 1)
      Set N = N - 1
   End If
End Function
```

	Your Answer	Correct Answer
1		
3	✔	✔
4		
6		

53.

What is displayed in Step 5 if A = 15 and B = 5 in the pseudocode below?

```
 Step 1: Start
Step 2: Read A, B
Step 3: C= A*B
Step 4: D=A/B Step
5: Print C
Step 6: Stop
```

	Your Answer	Correct Answer
3		
5		

	Your Answer	Correct Answer
15		
75	✔	✔

54.

What is displayed in step 3 if midterm = 60 and final = 65 in this pseudocode?

```
 Step 1: Declare midterm, final as integer
Step 2: average = (midterm+final)/2
Step 3: if (average < 50) then Print "Fail" Else Print "Pass"
          endif
```

	Your Answer	Correct Answer
Fail		
Pass	✔	✔
Average		
Average = (midterm + final)/2		

55.

How many times will count++ execute when i = 3, in this pseudocode?

```
 int count = 0;
int N = 4;
for (int i = 0; i < N; i++)
   for (int j = 0; j < i; j++)
      count++;
```

	Your Answer	Correct Answer
0		
1		

	Your Answer	Correct Answer
2		
3	✔	✔

56.

At the end of obj, what is the time complexity of inserting in this pseudocode?

```
 void DynamicArrayAppend(DynamicArray *obj, const void *input) {
   if (obj->logicalSize == obj->capacity - 1) {
      obj->capacity *= 2;
      obj->internalArray = realloc(obj->internalArray,
                obj->capacity * obj->itemSize);
   }
   obj->logicalSize += 1;
   DynamicArraySet(obj, obj->logicalSize - 1, input);
}

DynamicArray *obj = DynamicArrayCreate(sizeof(int));
for (int i = 0; i < n; i++) {
      int number = rand() % 10;
      DynamicArrayAppend(obj, &number);
}
```

	Your Answer	Correct Answer
O(1) or O(n)	✔	✔
O(-1) or O(n)		
O(1) or O(n*n)		
O(2) or O(log n)		

57.

What is the time complexity of this pseudocode?

```
double sumCol(double table[][], int numRows, int numCols, int col)
{
  double cSum = 0;
  for (int row = 0; row < numRows; row++)
  {
    cSum += table[row][col];
  }
  return cSum;
}
```

	Your Answer	Correct Answer
O(n)	✔	✔
O(1)		
O(n^2)		
O(log(n))		

 58.

What is the time complexity of the instructions in this pseudocode?

```
for (i = 0; i < N; i++) {
  for (j = i+1; j < N; j++) {
    ... // sequence of statements that do not alter N
  }
}
```

	Your Answer	Correct Answer
O(N)		
$O(N^2)$	✔	✔
O(log N)		
O(N log N)		

 59.

What is the time complexity of this pseudocode?

```
Algorithm Algo1(A)
    Input: An array A storing n ≥ 1 integers
    Output: The sum of the elements in A

    s=A[1]
    for i=1 to n do
      s=s+A[i]
    return s
```

	Your Answer	Correct Answer
O(n)		✔
O(1)		
O(log n)		
O(n log n)	✔	

60.

What is the time complexity of this pseudocode?

```
Algorithm Algo3(A, B)
Input: Arrays A and B, each of them storing n≥1 integers
Output: Count array B[i], where B[i] equals the sum of A[1] to A[i], i=1 to n
c=0
for i=1 to n do
  for j=1 to n do
    s=A[1]
    for k=1 to j do
      s=s+A[k]
      if B[i]=s then
        c=c+1
return c
```

	Your Answer	Correct Answer
O(1)		

	Your Answer	Correct Answer
$O(n^3)$	✔	✔
O(log n)		
O(n log n)		

61.

What is an attribute of a bubble sort algorithm?

	Your Answer	Correct Answer
Considered an adaptive sort		
Ideal for small number of n	✔	✔
Fast multiplication algorithm		
Uses finding the closest pair of points		

62.

What is a characteristic of quick sort?

	Your Answer	Correct Answer
Ability to detect that the list is sorted efficiently		
Input size is reduced by a constant factor for each step		
Recursively breaks down a problem into two or more subproblems of the same or related type	✔	✔
Finds distances between all pairs of points in a space of dimension d and selects the minimum		

63.

Which Big-O notation represents the time complexity of a bubble sort?

	Your Answer	Correct Answer
O(n)		
$O(n^{3/2})$		
O(log n)		
$O(n^2)$	✔	✔

64.

What is the typical run time for an insertion sort?

	Your Answer	Correct Answer
O(n)		
O(n + k)		
$O(n^2)$		✔
O(n log n)	✔	

65.

A large set of floating point numbers that are in range from 0.0 to 1.0 and are uniformly distributed across the range need to be sorted.

Which sort procedure is useful when the input is uniformly distributed over the range?

	Your Answer	Correct Answer
Radix	✔	
Shell		
Bubble		
Bucket		✔

66.

How many buckets are needed when sorting 13 numbers that have 15 digits each, using the radix-sort algorithm?

	Your Answer	Correct Answer
10		✔
13		
15		
28	✔	

67.

Four words were added to an initially empty linked list in the following order: orange, carrot, banana, and apple.

Which word is at the beginning of the list?

	Your Answer	Correct Answer
"apple"		
"banana"		
"carrot"		
"orange"	✔	✔

68.

Which type of sorting algorithm is demonstrated in this pseudocode?

```
for i from 0 to N - 1
  if a[i] > a[i + 1]
     swap( a[i], a[i + 1] )
end
```

	Your Answer	Correct Answer
Merge		

	Your Answer	Correct Answer
Bucket		
Bubble	✔	✔
Quicksort		

 69.

Which type of sorting algorithm is demonstrated in this pseudocode?

```
def shortSort(alist):
    exchanges = True
  passnum = len(alist)-1
    while passnum > 0 and exchanges:
       exchanges = False
       for i in range(passnum):
          if alist[i]>alist[i+1]:
             exchanges = True
             temp = alist[i]
             alist[i] = alist[i+1]
             alist[i+1] = temp
    passnum = passnum-1
```

	Your Answer	Correct Answer
Merge		
Radix		
Quick	✔	
Bubble		✔

 70.

Which type of sorting algorithm is demonstrated in this code?

```
 int partition( void *a, int low, int high )
{
int left, right;
```

```
void *pivot_item;
pivot_item = a[low];
pivot = left = low;
right = high;
while ( left < right ) {
   /* Move left while item < pivot */
   while( a[left] <= pivot_item ) left++;
   /* Move right while item > pivot */
   while( a[right] > pivot_item ) right--;
   if ( left < right ) SWAP(a,left,right);
   }
/* right is final position for the pivot */
a[low] = a[right];
a[right] = pivot_item;
return right;
}
```

	Your Answer	Correct Answer
Radix		
Quick		✔
Merge		
Bubble	✔	