DATA STRUCTURE PRE-ASSESSMENT

1. Which statement describes a queue data structure?

* 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.

1. Which data structure allows insertion and deletion at both front and the rear?

* Deques(Double ended queue)

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

-Stack

4. What are the official indexes for the list list01 given this declaration?  
  
 int[ ] list01 = {0, 2, 4, 6, 8, 10};

-A.) 0, 1, 2, 3, 4, 5

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?

--List

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

--Stack

7. Which data type does the mystery function return?

return\_type mystery (int R)  
{  
int NumUnits = R;  
return NumUnits \* 3.14;  
}

--Double

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))

--Tuple

9. Which value is appropriate for Test1 given the expression?  
  
char Test1;

--“L”

10. Which value is appropriate for the variable middle given the pseudocode?  
  
function mystery()  
{  
string last;  
string first;  
char middle;  
int phone;  
float rate;  
}

--“D”

11. Which type of operation is represented in the pseudocode?  
int x,y,z;  
x=y=z=100;

--Assignment

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]

--Array

13. Which data type is appropriate for this array to store the given data?  
  
a = ["AF", "71", "BC", "157", "BA", "253"]

--String

14. Which data type is appropriate for the given data set?  
  
a = [1, 717, 23, 12, 314, 6]

--Int

15. Which data type should be used for this object?  
  
days = { "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"}

--String

16. Which data type should be used for this variable?  
  
phoneNum = "212-555-1212"

--String

17. What is true about garbage collection?

-- It reclaims memory from data structures implemented using linked allocations.

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

--Storage is allocated using pointers to new locations as needed.

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?

--90 and 99.

20. What is the effect on the object Computing regarding garbage collection?  
  
Computing obj = new Computing(); obj = null;

--It is automatically 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

--90 and 99

22. Which data set is represented using the dictionary data type?

--A set of students and their test scores

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

--They are unique and immutable.

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

--D1[key].remove(value)

25. Given this data dictionary in Python:  
  
dict = {'white':0x0000, 'black':0x1111}  
  
26. Which command/function generates the output ['white','black']?

--dict.keys()

27. 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?

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

28. Which data structure is indexed?

--Heap

29. Which data structure may only store homogeneous data elements?

--Arrays.

30. What is a hierarchical data structure?

--Tree

31. What is an attribute of a binary tree?

--Each node has at most two children.

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

--Stack

33. Given:  
  
heapList = [22, 33, 44, 55, 66]  
  
Which index is the right child of item 22?

--44.

34. 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'?

--'bacon'  
'sausage'  
'toast'  
'eggs'  
'ham'

35. Items were added sequentially in this stack starting with "dog":  
"bird"  
"rabbit"  
"cat"  
"dog"  
  
What is the return value of the pop operation?

--Bird.

36. 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?

--['red','blue','yellow', 'green]

37. Items were added sequentially onto the stack starting with 'red':  
  
'green'  
'yellow'  
'blue'  
'red'  
  
What is the stack after a pop operation?

--'yellow'  
'blue'  
'red'

38. 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]

--hash(object)

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

--Returns True if any key of the dictionary is true.

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

--Java.io.FileInputStream

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

--Pop()

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

--Add(int index, Object x)

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

--Contains(Object x)

44. When should a dictionary be used instead of a list?

--When the program uses key-value pairs as its data

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

--Initialize the result to an empty list

46. 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?

--Checking that the list contains at least one number

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

--Printing the temperature

48. 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  
Step5: Print C  
Step 6: Stop  
---75.

49. 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

--Pass

50. 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++;

--3.

51. 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;  
}

--O(n)

52. 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  
}  
}

--O(N2)

53. 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

--O(n)

54. What is an attribute of a bubble sort algorithm?

--Ideal for small number of n

55. What is a characteristic of quick sort?

--Recursively breaks down a problem into two or more subproblems of the same or related type

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

--O(n 2)

57. What is the typical run time for an insertion sort?

--O(n 2)

58. 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?

--Bucket

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

--10.

60. 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?

--“orange”

61. 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

--Bubble

62. 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

--Bubble

Note: Sorting algorithm= bubble,quick, merge,radix.

63. 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;  
}

--Quick