[Dashboard](#)[My courses](#)[In19-S2-CS2022 \(112421\)](#)[1\(b\) Introduction to Sorting](#)[Quiz 1](#)

Started on Saturday, 19 December 2020, 8:22 AM

State Finished

Completed on Saturday, 19 December 2020, 8:29 AM

Time taken 7 mins 15 secs

Grade 8.33 out of 10.00 (83%)

Question 1

Correct

Mark 1.00 out of 1.00

Following pseudocode is used to sort a list using insertion sort.
What is the missing code segment (indicated as <missing>)?

```
INSERTION-SORT(A)
    for j = 2 to A.length
        key = A[j]
        i = j-1
        while i > 0 and A[i] > key
            <missing>
        A[i+1] = key
```

Select one:

a.

A[i+1] = A[i]

i = i-1 ✓

b.

A[i+1] = A[i]

i = i+1

c.

A[i-1] = A[i]

i = i-1

d.

A[i-1] = A[i]

i = i+1

Your answer is correct.

The correct answer is:

A[i+1] = A[i]

i = i-1

Question 2

Incorrect

Mark 0.00 out of 1.00

Which of the following is a computational task?

Select one:

a. What is 54×566 ?

b. Given a whole number A, is A prime?

c. What is $85 - 9 + 4$?

d. All of the Above ✗

Your answer is incorrect.

The correct answer is: Given a whole number A, is A prime?



Question 3
Correct
Mark 1.00 out of 1.00

The operation of processing each element in the list is known as

Select one:

- a. Traversal ✓
- b. Sorting
- c. Merging
- d. Inserting

Your answer is correct.

The correct answer is: Traversal

Question 4
Correct
Mark 1.00 out of 1.00

What is an Algorithm?

Select one:

- a. A way to solve a problem
- b. A step by step method of solving a computational task ✓
- c. A step by step method of solving a task
- d. A computer program

Your answer is correct.

The correct answer is: A step by step method of solving a computational task

Question 5
Correct
Mark 1.00 out of 1.00

Which of the following examples represent the worst case input for an insertion sort?

Select one:

- a. normal unsorted array
- b. array in sorted order
- c. large array
- d. array sorted in reverse order ✓

Your answer is correct.

The correct answer is: array sorted in reverse order

Question 6
Partially correct
Mark 0.33 out of 1.00

Standard way of specifying an algorithm is/are

Select one or more:

- a. Class Diagram
- b. Specifying Steps
- c. Pseudo Code ✓
- d. Flowcharts

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: Flowcharts, Pseudo Code, Specifying Steps

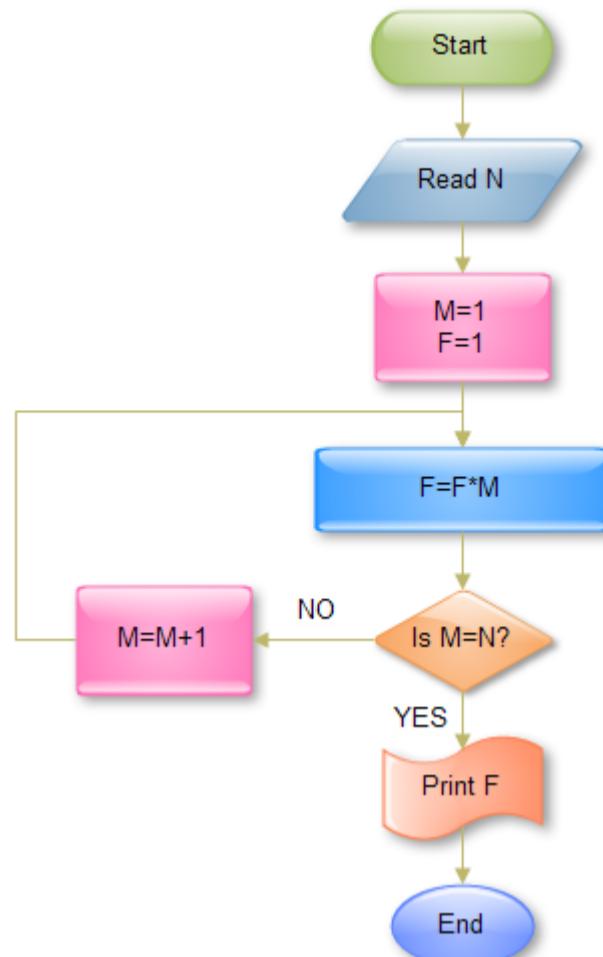


Question 7

Correct

Mark 1.00 out
of 1.00

What is the result (F) when the input (N) = 4?



Select one:

- a. 100
- b. 24 ✓
- c. 150
- d. 50

Your answer is correct.

The correct answer is: 24



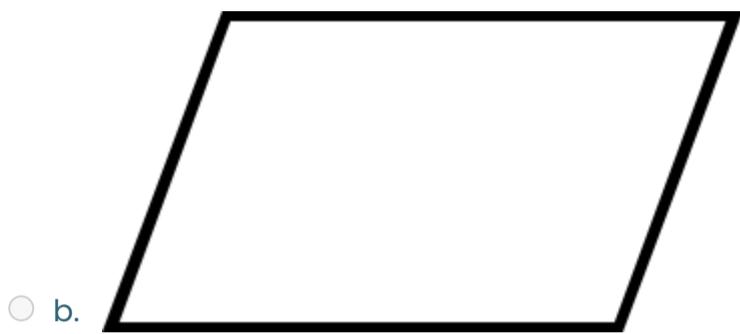
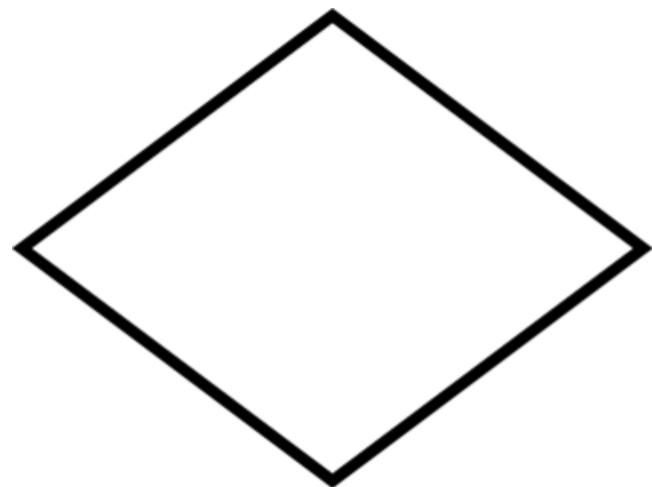
Question 8

Correct

Mark 1.00 out
of 1.00

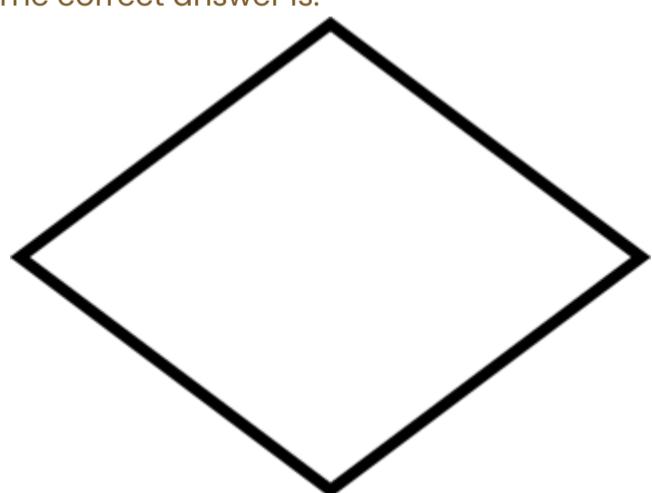
The flowchart symbol used to denote decision is

Select one:

 a. b. c. d.

Your answer is correct.

The correct answer is:



**Question 9**

Correct

Mark 1.00 out
of 1.00

The operation of arranging a list of integers in the order of increasing value is

Select one:

- a. Searching
- b. Sorting ✓
- c. Traversal
- d. None of the Above

Your answer is correct.

The correct answer is: Sorting

Question 10

Correct

Mark 1.00 out
of 1.00

A flowchart is a diagram that shows the “

flow of control

✓ ” of an algorithm/a program.

(Fill the blank using the most appropriate word/ phrase)

Your answer is correct.

The correct answer is:

A flowchart is a diagram that shows the “[flow of control]” of an algorithm/a program. (Fill the blank using the most appropriate word/ phrase)

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Started on Sunday, 27 December 2020, 4:04 PM

State Finished

Completed on Sunday, 27 December 2020, 4:17 PM

Time taken 13 mins 18 secs

Grade 7.50 out of 10.00 (75%)

Question 1

Incorrect

Mark 0.00 out
of 1.00

Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?

Select one or more:

- a. $O(n^4)$ ✓
- b. $\omega(n^3)$
- c. $\Omega(n^2)$ ✓
- d. $\Theta(n^4)$
- e. $o(n^3)$ ✗

Your answer is incorrect.

The correct answers are: $O(n^4), \Omega(n^2)$

Question 2

Correct

Mark 1.00 out
of 1.00

The space factor when determining the efficiency of algorithm is measured by

Select one:

- a. Counting the maximum disk space needed by the algorithm
- b. Counting the minimum memory needed by the algorithm
- c. Counting the average memory needed by the algorithm
- d. Counting the maximum memory needed by the algorithm ✓

Your answer is correct.

The correct answer is: Counting the maximum memory needed by the algorithm

**Question 3**

Correct

Mark 1.00 out
of 1.00

The Worst case occur in linear search algorithm when

Select one:

- a. Item is the last element in the array or is not there at all ✓
- b. Item is somewhere in the middle of the array
- c. Item is the last element in the array
- d. Item is not in the array at all

Your answer is correct.

The correct answer is: Item is the last element in the array or is not there at all

Question 4

Correct

Mark 1.00 out
of 1.00

What are the factors that affect the running time of a program?

Select one:

- a. CPU speed
- b. Nature of input data set
- c. Memory
- d. All of the above ✓

Your answer is correct.

The correct answer is: All of the above

Question 5

Correct

Mark 1.00 out
of 1.00Express the function $\frac{n^3}{1000} - 100n^2 - 100n + 3$ in terms of Θ -notation.

Select one:

- a. $\Theta(\log(n))$
- b. $\Theta(\sqrt{n})$
- c. $\Theta(n^3)$ ✓
- d. $\Theta(n^2)$

Your answer is correct.

The correct answer is: $\Theta(n^3)$ 

**Question 6**

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

Select one:

- a. $O(N \cdot \text{Sqrt}(N))$
- b. $O(N)$
- c. $O(N \cdot \log(N))$
- d. $O(N^2)$ ✓

Your answer is correct.

The correct answer is: $O(N^2)$ **Question 7**

Correct

Mark 1.00 out
of 1.00For the functions, $\log_2(n)$ and $\log_8(n)$, what is the asymptotic relationship between these functions?

Select one or more:

- a. $\log_2(n)$ is $\Theta(\log_8(n))$ ✓
- b. $\log_2(n)$ is $O(\log_8(n))$ ✓
- c. $\log_2(n)$ is $\Omega(\log_8(n))$ ✓

✓

Your answer is correct.

The correct answers are: $\log_2(n)$ is $O(\log_8(n))$, $\log_2(n)$ is $\Omega(\log_8(n))$, $\log_2(n)$ is $\Theta(\log_8(n))$ **Question 8**Partially
correctMark 0.50 out
of 1.00

Select the factors that are considered for analyzing algorithms.

Select one or more:

- a. Amount of work done
- b. Amount of memory used ✓
- c. HDD Space
- d. Amount of Memory available

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: Amount of work done, Amount of memory used



**Question 9**

Correct

Mark 1.00 out
of 1.00

The time factor when determining the efficiency of algorithm is measured by

Select one:

- a. Counting microseconds
- b. Counting the number of statements
- c. Counting the number of key operations ✓
- d. Counting the kilobytes of algorithm

Your answer is correct.

The correct answer is: Counting the number of key operations

Question 10

Incorrect

Mark 0.00 out
of 1.00

What is the time complexity of the following code?

```
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
    for (j = 2; j <= N; j = j * 2) {
        k = k + N/ 2;
    }
}
```

Select one:

- a. $O(N \log(N))$
- b. $O(N)$
- c. $O(N \sqrt{N})$
- d. $O(N^N)$ ✗

Your answer is incorrect.

The correct answer is:

 $O(N \log(N))$

PREVIOUS ACTIVITY

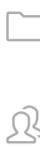
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Started on Saturday, 9 January 2021, 8:20 PM

State Finished

Completed on Saturday, 9 January 2021, 8:25 PM

Time taken 4 mins 33 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

[Recursion](#) is a method in which the solution of a problem depends on

Select one:

- a. Smaller instances of the same problem ✓
- b. Larger instances of different problems
- c. Larger instances of the same problem
- d. Smaller instances of different problems

Your answer is correct.

The correct answer is: Smaller instances of the same problem

Question 2

Correct

Mark 1.00 out of 1.00

A recursive function without If and Else conditions will always lead to?

Select one:

- a. Correct Results
- b. Incorrect Results
- c. Infinite Loop ✓
- d. Finite loop

Your answer is correct.

The correct answer is: Infinite Loop

Question 3

Incorrect

Mark 0.00 out of 1.00

In a little game, a computer is going to randomly select an integer from 1 to 1000. You'll keep guessing numbers until you find the computer's number, and the computer will tell you each time if your guess was too high or too low. How many guesses you need atmost in your worst case scenario given you use an optimal strategy?

Answer: 1000



The correct answer is: 10

Question 4

Correct

Mark 1.00 out
of 1.00

In recursion, the condition for which the function will stop calling itself is_____.

Select one:

- a. There is no such condition
- b. Base case ✓
- c. Worst case
- d. Best case

Your answer is correct.

The correct answer is: Base case

Question 5

Correct

Mark 1.00 out
of 1.00

Algorithm(s) which use divide and conquer approach

Select one or more:

- a. Selection Sort
- b. Merge sort ✓
- c. Insertion Sort
- d. Binary search ✓

Your answer is correct.

The correct answers are: Binary search, Merge sort

Question 6

Correct

Mark 1.00 out
of 1.00

What is the correct output of the following function for x=25

```
void RecurciveFunction(int x)
{
    if (x == 0)
        return;

    printf("%d", x%2);
    fun(x/2);
}
```

Select one:

- a. 11011
- b. 10011 ✓
- c. 01100
- d. 11111

Your answer is correct.

The correct answer is: 10011



**Question 7**

Correct

Mark 1.00 out
of 1.00

Consider a situation where you don't have function to calculate power (`pow()` function in C) and you need to calculate x^n where x can be any number and n is a positive integer. What can be the best possible time complexity of your power function?

Select one:

- a. $O(n)$
- b. $O(\text{Log}n)$ ✓
- c. $O(\text{Log}\text{Log}n)$
- d. $O(n\text{Log}n)$

Your answer is correct.

Power of a number can be calculated recursively.

Refer <https://www.geeksforgeeks.org/write-a-c-program-to-calculate-powxn/>

The correct answer is: $O(\text{Log}n)$

Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following recursion functions can be used to calculate factorial of a number.

Select one:

- a. $\text{fact}(n) = n * \text{fact}(n+1)$
- b. $\text{fact}(n) = n * \text{fact}(n-1)$ ✓
- c. $\text{fact}(n) = n * \text{fact}(1)$
- d. $\text{fact}(n) = n * \text{fact}(n)$

Your answer is correct.

The correct answer is: $\text{fact}(n) = n * \text{fact}(n-1)$

Question 9

Correct

Mark 1.00 out
of 1.00

Select the incorrect statement(s) about recursion?

Select one or more:

- a. Every recursive function need to have a base case
- b. Every recursive function need to have a return value ✓
- c. Infinite recursion can happen if the base case isn't properly declared
- d. A recursive function makes the code easier to understand

Your answer is correct.

The correct answer is: Every recursive function need to have a return value



Question 10

Correct

Mark 1.00 out
of 1.00

Consider Following Code

```
void my_recursive_function()
{
    my_recursive_function();
}
```

```
int main()
{
    my_recursive_function();
    return 0;
}
```

What will happen when the above snippet is executed?

Select one:

- a. The code will show a compile time error
- b. The code will run for some time and stop when the stack overflows ✓
- c. The code will be executed successfully and random output will be generated
- d. The code will be executed successfully and no output will be generated

Your answer is correct.

The correct answer is: The code will run for some time and stop when the stack overflows

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Started on Saturday, 23 January 2021, 4:16 PM

State Finished

Completed on Saturday, 23 January 2021, 4:52 PM

Time taken 36 mins

Marks 11.50/15.00

Grade 7.67 out of 10.00 (77%)

Question 1

Correct

Mark 1.00 out
of 1.00

What is/are the best data structure(s) to implement recursive function calls?

Select one or more:

- a. Binary Tree ✗
- b. Array
- c. Stack ✓
- d. Linked List

Your answer is correct.

The correct answer is: Stack

Question 2

Correct

Mark 1.00 out
of 1.00

There are n people born between the year 1000 A.D and 2018 A.D, is it possible to sort them by birthdate in $O(n \log(n))$ time.

Select one:

- True ✓
- False

Birthdate can be represented in a number format in a database, then we can use **Merge Sort** to sort them by birthdate.

The correct answer is 'True'.

Question 3

Correct

Mark 1.00 out
of 1.00

Given a set of integers, the number of comparisons necessary to find the maximum element is $n-1$ and the number of comparisons necessary to find the minimum element is $n-1$. Therefore the number of comparisons necessary to simultaneously find the smallest and the largest elements is $2n - 2$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 4

Correct

Mark 1.00 out
of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

- True
- False ✓

False.

Case 3 of the master theorem applies:

$f(n) = O(n^{\log_3 3}) = O(n)$ for $f(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.

Question 5

Correct

Mark 1.00 out
of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Solve for constants

Step 3 ✓

Verify by induction

Step 2 ✓

Guess the form of the solution

Step 1 ✓

Your answer is correct.

The correct answer is: Solve for constants → Step 3, Verify by induction → Step 2, Guess the form of the solution → Step 1

Question 6

Correct

Mark 1.00 out
of 1.00

Which is not a method for analyzing time complexity of recurrences?

Select one:

- a. Amortized Method ✓
- b. Recurrence Tree Method
- c. Master Method
- d. Substitution Method

Your answer is correct.

The correct answer is: Amortized Method



**Question 7**

Incorrect

Mark 0.00 out
of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

- a. It has a double linear complexity. ✗
- b. It has a linear time complexity.
- c. It has a linear time complexity and a linear space complexity.
- d. It has a double linear time complexity.

Your answer is incorrect.

The correct answer is: It has a linear time complexity.

Question 8

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for run time $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 3 T(n/3) + \sqrt{n}$$

Select one:

- a. $T(n) = \Theta(n \log n)$
- b. $T(n) = \Theta(n)$ ✓
- c. $T(n) = \Theta(n^2)$
- d. Master Theorem does not apply.

Your answer is correct.

The correct answer is: $T(n) = \Theta(n)$

Question 9

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 4T(n/2) + n^2\sqrt{n}$$

Select one:

- a. $T(n) = \Theta(n^2)$
- b. $T(n) = \Theta(n)$
- c. $T(n) = \Theta(n \log(n))$
- d. $T(n) = \Theta(n^{2.5})$ ✓

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{2.5})$



Question 10

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 10T(n/3) + 17n^{1.2}$$

Select one:

- a. $T(n) = \Theta(\lg^2(n))$
- b. $T(n) = \Theta(n^{\log_{10}(5)})$.
- c. $T(n) = \Theta(\log_2(n))$
- d. $T(n) = \Theta(n^{\log_3(10)})$.



The correct answer is: $T(n) = \Theta(n^{\log_3(10)})$.

Question 11

Incorrect

Mark 0.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 6T(n/3) - n^2\log n$$

Select one:

- a. $T(n) = \Theta(n^2\log(n))$ ✗
- b. $T(n) = n\log(n)$
- c. $T(n) = \Theta(n^2)$
- d. Master Theorem does not apply.

Your answer is incorrect.

The correct answer is: Master Theorem does not apply.



Question 12

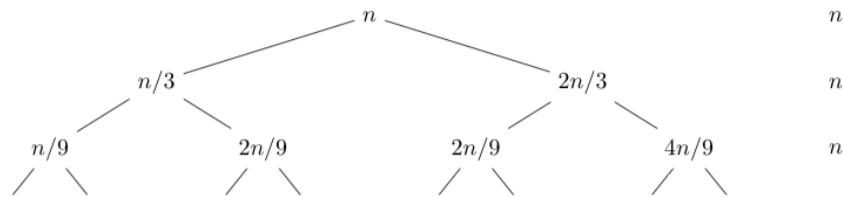
Correct

Mark 1.00 out of 1.00

Recursion Tree is one way to analyze recursive functions.

Consider a function with following time complexity.

$$T(n) = T(n/3) + T(2n/3) + n$$

Following figure shows the first 3 levels of the recursion tree.What is/are the number(s) which can appear in the next (4th) level in this recursion tree?

Select one or more:

- a. $n/27$ ✓
- b. $16n/27$
- c. $2n/27$ ✓
- d. $8n/27$ ✓

Your answer is correct.

The correct answers are: $n/27, 2n/27, 8n/27$ **Question 13**

Incorrect

Mark 0.00 out of 1.00

Consider the following sorting algorithm.

NEW-SORT (A, i, j)

```

if A[i] > A[j]
    then exchange A[i] ↔ A[j]
if i+1 ≥ j
    then return
k ← ⌊(j - i + 1)/ 3⌋          /* Round down */
NEW-SORT (A, i, j-k)           /* First two-thirds */
NEW-SORT (A, i+k, j)           /* Last two-thirds */
NEW-SORT (A, i, j-k)           /* First two-thirds again */

```

Recurrence for the worst-case running time of NEW-SORT can be given in generic form :

$$T(n) = a T(n/b) + f(n)$$

The value of a,b and f(n) are

Select one:

- a. $a=3, b=3/2, f(n)=O(1)$
- b. $a=3, b=2/3, f(n)=O(1)$ ✗
- c. $a=3, b=2/3, f(n)=O(n)$
- d. $a=3, b=3/2, f(n)=O(n)$
- e. none of the above

Your answer is incorrect.

The correct answer is: $a=3, b=3/2, f(n)=O(1)$ 

**Question 14**

Partially correct

Mark 0.50 out of 1.00

Given a set 'S' of n integers and another integer x, an algorithm should determine whether or not there exists two elements in S whose sum is exactly x . A possible algorithm for this task is described below.

- 1) Sort the elements in S using any efficient sorting algorithm.
- 2) Remove the last element from S. Let y be the value of the removed element.
- 3) If S is non-empty, look whether an element z exist in S where $z=x-y$
- 4) If S contains such an element z, then stop, since we have found y and z such that $x=y+z$; otherwise repeat Step 2.
- 5) If S is empty, then no two elements in S sum to x.

Select the correct statement(s) regarding above approach.

Select one or more:

- a. Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity. ✓
- b. Best time complexity to do Step 3 is $\Theta(n)$.
- c. Time complexity of this algorithm is $\Theta(n \lg n)$.
- d. There are algorithms which can solve this task with better time complexity than above described algorithm

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity., Time complexity of this algorithm is $\Theta(n \lg n)$.

Question 15

Correct

Mark 1.00 out of 1.00

Solve the following Recursive Algorithm:

$$T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T\left(\frac{n}{2}\right) + F'(n) & \text{if } n>1 \end{cases}$$

Select one:

- a. $T(n) = O(n^2)$
- b. $T(n) = O(n)$
- c. $\mathcal{O}(T(n)) = O(n \log(n))$ ✓
- d. $\mathcal{O}(T(n)) = O(\log(n))$

Your answer is correct.

The correct answer is: $\mathcal{O}(T(n)) = O(n \log(n))$



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Completed on Thursday, 28 January 2021, 9:46 PM

Time taken 10 mins 55 secs

Marks 10.00/12.00

Grade 8.33 out of 10.00 (83%)

Question 1

Correct

Mark 1.00 out
of 1.00

Which of the following statement is wrong regarding Python lists and arrays.

Select one:

- a. Both can be indexed and iterated through
- b. Both can be sliced
- c. A Python array with numbers can be divided by a certain number while doing same on python list will result in Type error.
- d. All statements are correct ✓

Your answer is correct.

The correct answer is: All statements are correct

Question 2

Incorrect

Mark 0.00 out
of 1.00

The data structure required to check whether an expression contains balanced parenthesis is?

Select one:

- a. Queue
- b. Stack
- c. Array ✗
- d. Tree

Your answer is incorrect.

The correct answer is: Stack



Question 3

Correct

Mark 1.00 out
of 1.00

Choose the output of the following code segment on python list

:

 $A = [1, 2, 3, 4, 5, 6, 7, 8, 9]$ $A[::2] = 10, 20, 30, 40, 50, 60$ $\text{Print}(A)$

Select one:

- a. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
- b. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]
- c. [1, 2, 10, 20, 30, 40, 50, 60]
- d. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5

Question 4

Correct

Mark 1.00 out
of 1.00

Choose the key advantage of a circular queue:

Select one:

- a. Effective usage of processor
- b. Fast access
- c. None of the mentioned
- d. Effective usage of memory ✓

The correct answer is: Effective usage of memory

Question 5

Correct

Mark 1.00 out
of 1.00

What does 'stack overflow' mean by :

Select one:

- a. Accessing an undefined item from stack
- b. Inserting a large amount of data that is larger than the available memory
- c. Inserting new items to a full stack ✓
- d. Deleting an item from an empty stack

The correct answer is: Inserting new items to a full stack

Question 6

Correct

Mark 1.00 out
of 1.00

Consider the following postfix notations and find out the answer using stack operations:

 $8, 14, 6, +, *, 8, 40, 20, /, +, * \text{ is?}$

Select one:

- a. 16
- b. 1600 ✓
- c. 16000
- d. 160

The correct answer is: 1600



Question 7

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding arrays and list

Select one or more:

- a. In a List, elements are spread about in memory, but linked together. ✓
- b. One advantage of the array compared to list is the ability to perform random access without additional data structures. ✓
- c. Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array. ✓
- d. Insertion is easier in the array compared to list.



Your answer is correct.

The correct answers are: Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array., One advantage of the array compared to list is the ability to perform random access without additional data structures., In a List, elements are spread about in memory, but linked together.

Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

Select one:

- a. Deleting a node whose location is given ✓
- b. Searching of an unsorted list for a given item
- c. Inverting a node after the node with given location
- d. Traversing a list to process each node

Your answer is correct.

The correct answer is: Deleting a node whose location is given

Question 9

Correct

Mark 1.00 out
of 1.00

What is the output of the following code segment on python dictionary:

```
a = {(1,2):1,(2,3):2}
```

```
Print(a[1,2])
```

Answer: 1



The correct answer is: 1



**Question 10**

Incorrect

Mark 0.00 out
of 1.00

In linked list implementation of queue, if only front pointer is maintained, which of the following operation take worst case linear time?

Select one:

- a. Deletion
- b. Both Insertion and To empty a queue
- c. To empty a queue
- d. Insertion ✗

Your answer is incorrect.

The correct answer is: Both Insertion and To empty a queue

Question 11

Correct

Mark 1.00 out
of 1.00

Which of the following is not a data structure

Select one:

- a. Array
- b. Record
- c. Dictionary
- d. Variable ✓

The correct answer is: Variable

Question 12

Correct

Mark 1.00 out
of 1.00

Choose a statement about stacks that is not correct?

Select one:

- a. Pop and push are the primary operations used in stacks
- b. Stack is a FIFO data structure ✓
- c. Top of the stack always contains the latest item
- d. Linked list are used for implementing stacks

The correct answer is: Stack is a FIFO data structure

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Started on Sunday, 14 February 2021, 11:41 PM

State Finished

Completed on Sunday, 14 February 2021, 11:46 PM

Time taken 4 mins 37 secs

Grade 9.50 out of 10.00 (95%)

Question 1

Correct

Mark 1.00 out
of 1.00

Select whether the following statement is True/False.

Binary Search is appropriate for linked lists

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 2

Correct

Mark 1.00 out
of 1.00

Resulting tree of binary search tree dose not depend on the value insertion order

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 3

Correct

Mark 1.00 out
of 1.00

By which Factor does the Binary Search Narrows the Search?

Select one:

- a. Four (4) times at each iteration
- b. Two (2) times at each search operation
- c. Does not narrow the search by any factor
- d. Two (2) times at each iteration ✓

The correct answer is: Two (2) times at each iteration



**Question 4**

Partially correct

Mark 0.50 out of 1.00

Which of the following statement(s) is/are correct regarding a binary search tree?

Select one or more:

- a. The expected height of a randomly built binary search tree is $O(\lg n)$. ✓
- b. It takes $O(\lg n)$ time to walk an n-node binary search tree.
- c. Basic operations on any randomly built binary search tree take $\Theta(\lg n)$ time.
- d. Basic operations on any randomly built binary search tree take time proportional to the height of the tree.

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: The expected height of a randomly built binary search tree is $O(\lg n)$, Basic operations on any randomly built binary search tree take time proportional to the height of the tree.

Question 5

Correct

Mark 1.00 out of 1.00

Consider numbers 3, 9, 1, 17, 14, 22, 20. These numbers are inserted in to a balanced binary tree, Which tree traversal method would output the following sequence.

14, 3, 1, 9, 20, 17, 22

Select one:

- a. Non of the above
- b. Preorder ✓
- c. Postorder
- d. Inorder

The correct answer is: Preorder

Question 6

Correct

Mark 1.00 out of 1.00

In a pre-order traversal of a binary search tree, the first item printed out is always the smallest one.

Select one:

- True
- False ✓

The correct answer is 'False'.



**Question 7**

Correct

Mark 1.00 out
of 1.00What is the number of nodes at depth d in a k -ary Tree?

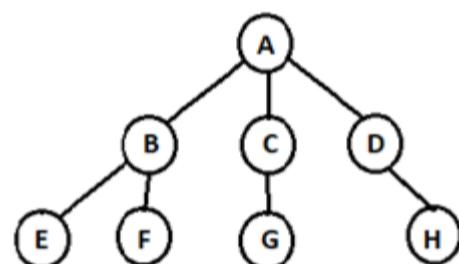
Select one:

 a. kd b. d^k c. k^d  d. $d!$ The correct answer is: k^d **Question 8**

Correct

Mark 1.00 out
of 1.00

What is(are) the leaf node(s) in thee following K-ary Tree



Select one or more:

 a. G ✓ b. A c. F ✓ d. B

Your answer is correct.

The correct answers are: F, G

Question 9

Correct

Mark 1.00 out
of 1.00

What is the largest number of nodes BST can have with depth of 3

Answer: 

The correct answer is: 15



Question 10

Correct

Mark 1.00 out
of 1.00***BINARY_SEARCH(List, Key)****if length of the List is 0* Return false ✓*else if the middle element is equal to Key* return true/ return index ✓*else if the Key is less than the middle element* BINARY_SEARCH(First Half of the List, Key) ✓*Else* BINARY_SEARCH(Second Half of List, Key) ✓

Your answer is correct.

The correct answer is:

*BINARY_SEARCH(List, Key)**if length of the List is 0*

[Return false]

else if the middle element is equal to Key

[return true/ return index]

else if the Key is less than the middle element

[BINARY_SEARCH(First Half of the List, Key)]

Else

[BINARY_SEARCH(Second Half of List, Key)]

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Started on Saturday, 20 February 2021, 11:20 PM

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Completed on Saturday, 20 February 2021, 11:55 PM

Time taken 34 mins 58 secs

Overdue 4 mins 58 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Consider a binary min heap containing n elements and every node is having degree 2 (i.e. full binary min heap tree). What is the probability of finding the largest element at the last level ?

Select one:

- a. 1 ✓
- b. $1/n$
- c. $1/2^n$
- d. $1/2$

Your answer is correct.

The correct answer is: 1

Question 2

Correct

Mark 1.00 out of 1.00

What is the worst-time complexity of HEAPSORT operation?

Select one:

- a. $O(n \log(n))$ ✓
- b. $O(n^2)$
- c. $O(n)$
- d. $O(\log(n))$

The correct answer is: $O(n \log(n))$

Question 3

Correct

Mark 1.00 out of 1.00

What is the worst-time complexity of Heapinsert operation?

Select one:

- a. $O(n^2)$
- b. $O(n)$
- c. $O(\log(n))$ ✓
- d. $O(n \log(n))$

The correct answer is: $O(\log(n))$

Question 4

Correct

Mark 1.00 out
of 1.00

What is the time complexity of following algorithm which is created to return the smallest index i at which $x \leq a[i]$ for a given array?

```
func Search(a []int, x int) int {
    switch len(a) {
    case 0:
        return 0
    case 1:
        if x <= a[0] {
            return 0
        }
        return 1
    }
    mid := 1 + (len(a)-1)/2
    if x <= a[mid-1] {
        return Find(a[:mid], x)
    }
    return mid + Find(a[mid:], x)
}
```

Select one:

- a. $O(n \log n)$
- b. $O(n)$
- c. $O(n^2)$
- d. $O(\log n)$ ✓

Your answer is correct.

we simplify the problem by only computing the asymptotic time complexity, and let all constants be 1. Then the recurrences become

- $T(1) = 1$, (*)
- $T(n) = 1 + T(n/2)$, when $n > 1$.

it's possible to find a solution by repeated substitution.

$$\begin{aligned} T(n) &= (**) \\ 1 + T(n/2) &= (**) \\ 1 + (1 + T(n/4)) &= 2 + T(n/4) = (**) \\ 2 + (1 + T(n/8)) &= 3 + T(n/8) = \dots \\ k + T(n/2^k) &= \dots \\ \log n + T(n/2^{\log n}) &= \log n + T(1) = (*) \\ \log n + 1 &= \Theta(\log n). \end{aligned}$$
The correct answer is: $O(\log n)$ **Question 5**

Correct

Mark 1.00 out
of 1.00

Which of the following is not a standard in-place sorting algorithm?

Select one:

- a. Merge sort ✓
- b. Selection sort
- c. Quick sort
- d. Heap sort

The correct answer is: Merge sort



Question 6

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of BUILDHEAP operation?

Select one:

- a. $O(n \log(n))$
- b. $O(n)$ ✓
- c. $O(\log(n))$
- d. $O(n^2)$

The correct answer is: $O(n)$ **Question 7**

Correct

Mark 1.00 out
of 1.00

Heap Data Structure is an Array Object that can be Viewed as a

Complete Binary Tree ✓

Your answer is correct.

Heap Data Structure is an Array Object that can be Viewed as a
[[1]]

The correct answer is:

Heap Data Structure is an Array Object that can be Viewed as a
[Complete Binary Tree]**Question 8**

Correct

Mark 1.00 out
of 1.00

What is the typical running time of a heap sort algorithm?

Select one:

- a. $O(N^2)$
- b. $O(\log N)$
- c. $O(N)$
- d. $O(N \log N)$ ✓ The total running time of a heap sort
algorithm is mathematically found to be $O(N \log N)$.

Your answer is correct.

The correct answer is: $O(N \log N)$ 

Question 9

Correct

Mark 1.00 out
of 1.00

```
BUILD-MIN-HEAP(A)
A.heapsize = A.length
for i = A.length/2 down to 1
    MIN-HEAPIFY(A,i)
```

Running time for the "MIN-HEAPIFY" operation is $O(\log n)$. What is the time complexity of "BUILD-MIN-HEAP" operation.

Select one:

- a. $O(n)$ ✓
- b. $O(\log n^2)$
- c. $O(n^2 \log n)$
- d. $O(n \log n)$

Your answer is correct.

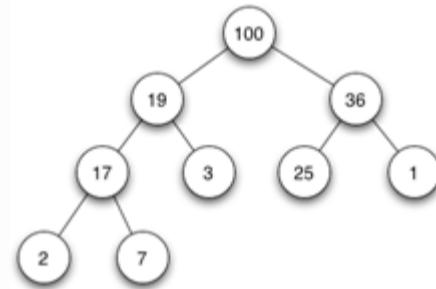
<https://www.growingwiththeweb.com/data-structures/binary-heap/build-heap-proof/>

The correct answer is: $O(n)$ **Question 10**

Correct

Mark 1.00 out
of 1.00

If we implement heap as Max-Heap, adding a new node of value 15 to the leftmost node of the right sub tree. What value will be at leaf nodes of the right sub tree of the heap?



Select one:

- a. 15 and 1 ✓
- b. 25 and 1
- c. 2 and 3
- d. 3 and 1

The correct answer is: 15 and 1

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Started on Saturday, 6 March 2021, 7:39 PM

State Finished

Completed on Saturday, 6 March 2021, 7:44 PM

Time taken 4 mins 42 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

What is the load factor?

Select one:

- a. Average key size
- b. Average array size
- c. Average chain length ✓ In simple chaining, load factor is the average number of elements stored in a chain, and is given by the ratio
- d. Average hash table length

Your answer is correct.

The correct answer is: Average chain length

Question 2

Correct

Mark 1.00 out
of 1.00

Suppose you have a Hash Table that has 500 slots. It currently holds 99 keys, all in different locations in the Hash Table (i.e., there are no collisions thus far). What is the probability that the next key you insert will cause a collision? Input your answer in decimal form and round to the nearest 3 digits.

Answer: 0.198



The correct answer is: 0.198

Question 3

Correct

Mark 1.00 out
of 1.00

Hash table is?

Select one:

- a. A structure used for storage
- b. A structure that maps keys to values ✓
- c. A structure used to implement stack and queue
- d. A structure that maps values to keys

The correct answer is: A structure that maps keys to values

**Question 4**

Correct

Mark 1.00 out
of 1.00

When several elements are competing for the same bucket in the hash table, it is called?

Select one:

- a. Collision ✓
- b. Replication
- c. Chaining
- d. None of the mentioned

The correct answer is: Collision

Question 5

Correct

Mark 1.00 out
of 1.00

A hash function is

Select one:

- a. None of the mentioned
- b. A function that computes the location of the key in the array ✓
- c. A function with allocated memory to keys
- d. A function that creates an array

The correct answer is: A function that computes the location of the key in the array

Question 6

Correct

Mark 1.00 out
of 1.00

Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, select the resulting tables after inserting the values in the given order with linear probing.

Select one:

- a. 0 [3920] 1 [430] 2 [22] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- b. 0 [430] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- c. 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]
✓
- d. 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234]

The correct answer is: 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]



Question 7

Correct

Mark 1.00 out
of 1.00

The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?



Select one:

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

 a.

0	
1	
2	12, 2
3	13, 3, 23
4	
5	5, 15
6	
7	
8	18
9	

 b.

0	
1	
2	2
3	23
4	
5	15
6	
7	
8	18
9	

 c.

0	
1	
2	12
3	13
4	
5	5
6	
7	
8	18
9	

 d.

Your answer is correct.





0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

The correct answer is:

Question 8

Correct

Mark 1.00 out
of 1.00

The hash function for a hash table is

$$H_1(k) = k \% 50.$$

In the case of collision, the hash function used is

$$H(k) = (H_1(k) + M \times H_2(k)) \% 50$$

where $H_1(k) = k \% 50$ and $H_2(k) = k \% 20$.

M is initialized to 0 and is incremented by 1 each time a collision occurs.

This could be categorized under which of the following collision detection technique?

Select one:

- a. Re-Hashing
- b. Quadratic Probing
- c. Double Hashing ✓
- d. Linear Probing

Your answer is correct.

The correct answer is: Double Hashing

Question 9

Correct

Mark 1.00 out
of 1.00

Possible hash function to store string in hash table is the string's length, $h(x) = x.length$. This a good hash function.

Select one:

- True
- False ✓

Strings with the same length will have the same hash code. If we insert lots of strings with the same length, lookup will take $O(n)$ time instead of $O(1)$

The correct answer is 'False'.



Question 10

Correct

Mark 1.00 out
of 1.00Calculate $P_{3,5}(\geq 1 \text{ collision})$.**Hint:** $P_{N,M}(\geq 1 \text{ collision}) = 1 - P_{N,M}(\text{no collision})$

Where N is number of insertions and M is no of slots

Input your answer in decimal form and round to the nearest 2 digitsAnswer: ✓

3 insertions into 5 slots

 $P(\text{no collision 1st}) = 1$, all slots empty $P(\text{no collision 2nd}) = 4/5$, 1 slot filled $P(\text{no collision 3rd}) = 3/5$, 2 slots filledthus $P(\text{no collisions}) = 1(4/5)(3/5) = 0.48$ $P(\geq 1 \text{ collision}) = 1 - P(\text{no collisions}) = 1 - 0.48 = 0.52$

The correct answer is: 0.52

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HashTables](#)**NEXT ACTIVITY**[Hashtable Demo ►](#)

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Started on Wednesday, 24 March 2021, 8:00 PM

State Finished

Completed on Wednesday, 24 March 2021, 8:18 PM

Time taken 18 mins 44 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Time Complexity of Breadth First Search is:

Select one:

- a. $O(V + E)$ ✓
- b. $O(V * E)$
- c. $O(\log(V + E))$
- d. $O(V / E)$

Your answer is correct.

The correct answer is: $O(V + E)$

Question 2

Correct

Mark 1.00 out of 1.00

For a Graph $G = (V, E)$ and source vertex s , Breadth First Search(BFS) algorithm builds breadth-first tree with root s that contains all reachable vertices.

Select one:

- True ✓
- False

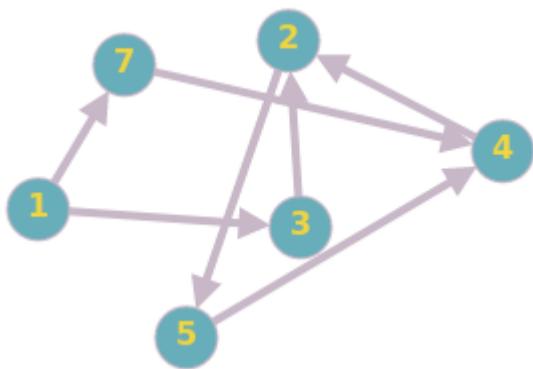
The correct answer is 'True'.

Question 3

Correct

Mark 1.00 out
of 1.00

Find an output of a Breadth-First Traversal of the following graph starting from Node 1:



Select one:

- a. 1 7 3 4 2 5
- b. 1 3 2 5 4 7
- c. 1 3 7 4 2 5
- d. 1 3 7 2 4 5 ✓

Your answer is correct.

The correct answer is: 1 3 7 2 4 5

Question 4

Correct

Mark 1.00 out
of 1.00

When the Breadth First Search of a graph will be unique?

Select one:

- a. When the graph has no cycle
- b. When the graph is a Binary Tree
- c. When the graph is a Linked List ✓
- d. When the graph is a n-ary Tree

Your answer is correct.

The correct answer is: When the graph is a Linked List

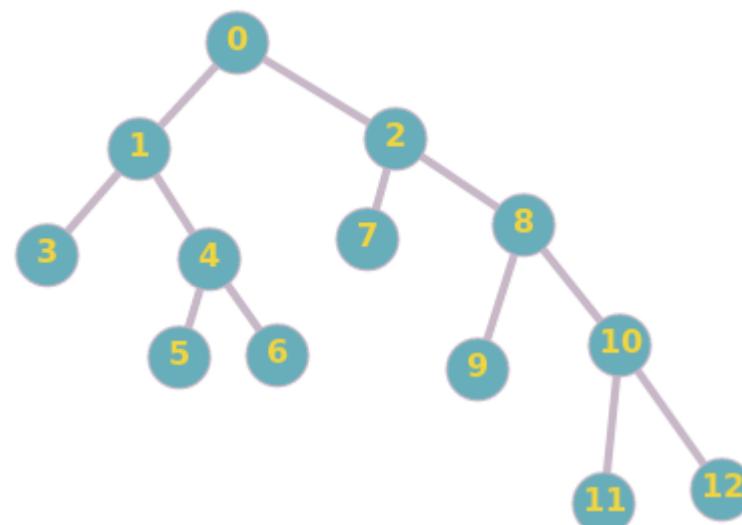


Question 5

Correct

Mark 1.00 out
of 1.00

Find the output of Depth-First search of the following tree using pre-order traversal :



Select one:

- a. 3 1 5 4 6 0 7 2 9 8 11 10 12
- b. 0 1 2 3 4 7 8 5 6 9 10 11 12
- c. 0 1 3 4 5 6 2 7 8 9 10 11 12 ✓
- d. 3 5 6 4 1 7 9 11 12 10 8 2 0

Your answer is correct.

The correct answer is: 0 1 3 4 5 6 2 7 8 9 10 11 12

Question 6

Correct

Mark 1.00 out
of 1.00

The Data structure used in standard implementation of Breadth First Search is?

Select one:

- a. Stack
- b. Linked List
- c. Tree
- d. Queue ✓

Your answer is correct.

The correct answer is: Queue

Question 7

Correct

Mark 1.00 out
of 1.00

Regarding implementation of Breadth First Search using queues, at a given time, what is the maximum difference between depth of any two nodes present in the queue?

Select one:

- a. Atmost 1 ✓
- b. Can be anything
- c. 0
- d. Insufficient Information

Your answer is correct.

The correct answer is: Atmost 1



Question 8

Correct

Mark 1.00 out
of 1.00

Pseudo codes for Breadth First Search(BFS) and Depth First Search(DFS) which look alike except one line is given below. Select the correct pseudo code segments for STATEMENT 1 and STATEMENT 2.

BFS(G)

```
{
list L = empty
tree T = empty
choose a starting vertex x
search(x)
while(L nonempty)
    STATEMENT 1
        if w not yet visited
        {
            add (v,w) to T
            search(w)
        }
    }

DFS(G)
{
list L = empty
tree T = empty
choose a starting vertex x
search(x)
while(L nonempty)
    STATEMENT 2
        if w not yet visited
        {
            add (v,w) to T
            search(w)
        }
}

search(vertex v)
{
visit(v);
for each edge (v,w)
    add edge (v,w) to end of L
}
```

STATEMENT 2

remove edge (v,w) from end of L



STATEMENT 1

remove edge (v,w) from start of L



Your answer is correct.

<https://www.ics.uci.edu/~eppstein/161/960215.html>

Both of these search algorithms keep a list of edges to explore; the only difference between the two is that, while both algorithms adds items to the end of L, BFS removes them from the beginning, which results in maintaining the list as a queue, while DFS removes them from the end, maintaining the list as a stack.

The correct answer is: STATEMENT 2 → remove edge (v,w) from end of L, STATEMENT 1 → remove edge (v,w) from start of L



**Question 9**

Correct

Mark 1.00 out
of 1.00

Traversal of a graph is different than tree because.

Select one:

- a. There can be a loop in the graph ✓
- b. DFS on a graph uses stack, while inorder traversal is recursive
- c. Both (a) and (b)
- d. None of the above

Your answer is correct.

The correct answer is: There can be a loop in the graph

Question 10

Correct

Mark 1.00 out
of 1.00

Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures

Depth first search

Stack ✓

Breadth first search

Queue ✓

Sorting

Heap ✓

Your answer is correct.

Among the given choices, queue is the most appropriate for BFS, stack for DFS and heap for sorting

The correct answer is: Depth first search → Stack, Breadth first search → Queue, Sorting → Heap

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Started on Friday, 26 March 2021, 10:36 PM

State Finished

Completed on Friday, 26 March 2021, 10:48 PM

Time taken 12 mins 24 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Select the correct answers regarding statement A and statement B

- A) A directed graph is acyclic if DFS yields no back edges
B) DFS yields no back edges if a directed graph is acyclic

Select one:

- a. Only statement B is true
- b. Only statement A is true
- c. *Both statements are false*
- d. Both Statements are true ✓

Your answer is correct.

The correct answer is: Both Statements are true

Question 2

Correct

Mark 1.00 out of 1.00

Is the following statement True/False?

Steiner Minimum Trees (SMT) are **not** similar to Minimum Spanning Tree (MST) under any circumstance.

Select one:

- True
- False ✓

The correct answer is 'False'.



**Question 3**

Incorrect

Mark 0.00 out
of 1.00

Select the correct algorithms for computing Minimum Spanning Trees

A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it

Kruskal's Algorithm



A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph.

Prim's Algorithm



Your answer is incorrect.

The correct answer is: A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it → Prim's Algorithm, A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph. → Kruskal's Algorithm

Question 4

Correct

Mark 1.00 out
of 1.00

Consider the following statements regarding Spanning Trees and Minimum Spanning Trees

- A) A spanning tree with N vertices will always have $N-1$ edges.
- B) A Minimum spanning tree with N vertices will always have $N-1$ edges.

Select one:

- a. Both A and B are false
- b. Only B is true
- c. Only A is true
- d. Both A and B are true ✓

Your answer is correct.

The correct answer is: Both A and B are true

Question 5

Correct

Mark 1.00 out
of 1.00

Consider a weighted complete graph G on the vertex set V_1, V_2, \dots, V_n such that the weight of the edge (V_i, V_j) is $2|i - j|$. The weight of a minimum spanning tree of G is:

Select one:

- a. $n^2 C_2$
- b. $n - 1$
- c. $2n - 2$ ✓
- d. n^2

The correct answer is: $2n - 2$



Question 6

Correct

Mark 1.00 out
of 1.00

An undirected graph G has n nodes. Its adjacency matrix is given by an $n \times n$ square matrix whose (i) diagonal elements are 0's and (ii) non-diagonal elements are 1's.

Which one of the following is TRUE?

Select one:

- a. Graph G has multiple distinct MSTs, each of cost $n-1$ ✓
- b. Graph G has no minimum spanning tree (MST)
- c. Graph G has a unique MST of cost $n-1$
- d. Graph G has multiple spanning trees of different costs

The correct answer is: Graph G has multiple distinct MSTs, each of cost $n-1$

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a complete undirected graph with vertex set $\{0, 1, 2, 3, 4\}$. W_{ij} entry in the matrix W below is the weight of the edge $\{i, j\}$.

In the graph given, what is the minimum possible weight of a path P from vertex 1 to vertex 2 in this graph such that P contains at most 3 edges?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 10
- b. 7
- c. 9
- d. 8 ✓

The correct answer is: 8

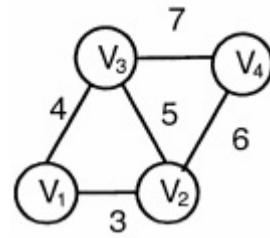


Question 8

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What is the length of the path from V_5 to V_6 in the MST of the above graph with $n = 10$?

Select one:

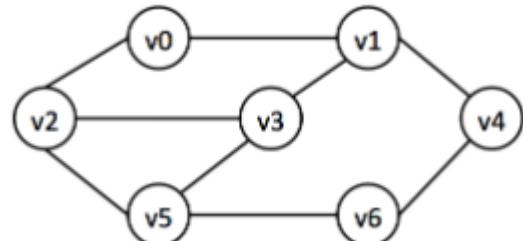
- a. 41
- b. 11
- c. 25
- d. 31 ✓

The correct answer is: 31

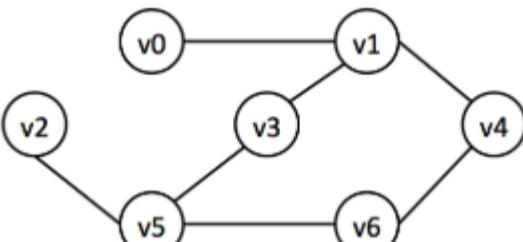


Question 9

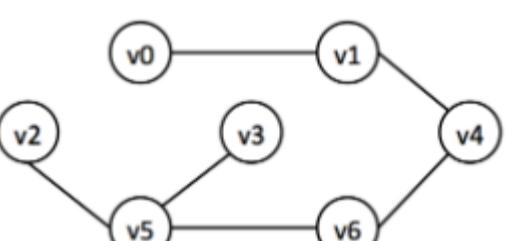
Correct

Mark 1.00 out
of 1.00Select all valid **spanning trees** of the graph below

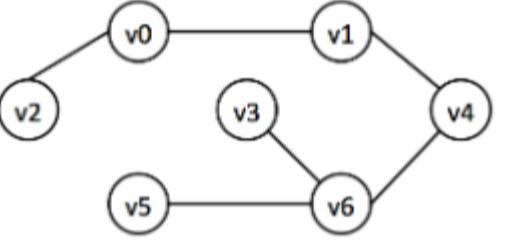
A)



B)



C)



Select one:

- a. B only ✓
- b. All A,B and C
- c. Both B and C
- d. It depends on the weight of the edges

Your answer is correct.

The correct answer is: B only

Question 10

Correct

Mark 1.00 out
of 1.00

A **maximum spanning tree** is a spanning tree with weight greater than or equal to the weight of every other spanning tree. A student claims that such a tree can be found with algorithms such as Prim's or Kruskal's after multiplying the edge weights by -1 and solving the MST problem on the new graph. His/Her claim is

Select one:

- True ✓
- False

The correct answer is 'True'.

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NEXT ACTIVITY



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◀ Lecture Slides:
Minimum Spanning
Trees

Lecture Slides: Single-
Source Shortest Path ►



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Started on Wednesday, 7 April 2021, 5:48 PM

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Completed on Wednesday, 7 April 2021, 6:06 PM

Time taken 18 mins 9 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

What is the time complexity of Dijkstra's shortest path algorithm?

Select one:

- a. $O(|V|)$
- b. $O(|V|^2)$ ✓
- c. $O(|E| |V|)$
- d. $O(|E| \log |V|)$

Your answer is correct.

The correct answers are: $O(|E| \log |V|)$, $O(|V|^2)$

Question 2

Correct

Mark 1.00 out of 1.00

What is the worst case space complexity of Bellman Ford algorithm?

Select one:

- a. $O(|E|)$
- b. $O(|V|)$ ✓
- c. $O(|E| |V|)$
- d. $O(|V|^2)$

The correct answer is: $O(|V|)$

Question 3

Correct

Mark 1.00 out of 1.00

The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Your answer is correct.

The correct answer is:

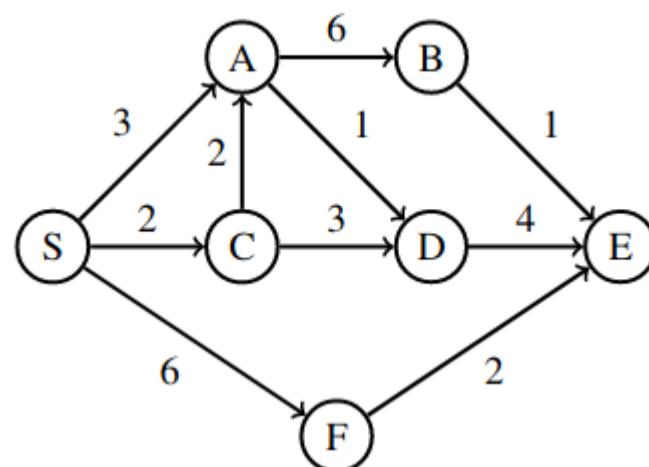
The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Question 4

Incorrect

Mark 0.00 out
of 1.00

Run Dijkstra's algorithm on the following directed graph, starting at vertex S. What is the order in which vertices get removed from the priority queue?



Select one:

- a. F, S, A, C, D, E, B
- b. B, A, C, F, D, E, S
- c. S, C, A, D, F, E, B
- d. S, A, C, F, D, E, B ✗

Your answer is incorrect.

The correct answer is: S, C, A, D, F, E, B

Question 5

Correct

Mark 1.00 out
of 1.00

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all same. - Breadth First Search ✓
2. For graphs where the edge-weights are non-negative. - Dijksta's Alogrithm ✓
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists. - Bellman-Ford Algorithm ✓

Your answer is correct.

The correct answer is:

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all same. - [Breadth First Search]
2. For graphs where the edge-weights are non-negative. - [Dijksta's Alogrithm]
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists. - [Bellman-Ford Algorithm]



Question 6

Correct

Mark 1.00 out
of 1.00

For what cases can we apply Bellmann Ford algorithm?

Select one or more:

- a. Undirected and unweighted graphs
- b. Undirected and weighted graphs
- c. Directed and weighted graphs ✓
- d. All directed graphs

Your answer is correct.

The correct answer is: Directed and weighted graphs

Question 7

Correct

Mark 1.00 out
of 1.00

Select the correct pseudo code to compute the shortest path in Dijkstra's algorithm?

Select one:

 a.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase (T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

 b.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase(T[w].Dist to T[v].Dist);
        T[w].path=v; }
```

 c.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

✓

 d.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) > T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

Your answer is correct.

The correct answer is:

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```



Question 8

Correct

Mark 1.00 out
of 1.00

Given a graph $G = (V,E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.

Select one:

- True ✓
 False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.

The correct answer is 'True'.

Question 9

Correct

Mark 1.00 out
of 1.00

Consider a weighted, directed acyclic graph $G = (V, E, w)$ in which edges that leave the source vertex s may have negative weights and all other edge weights are non-negative. Does Dijkstra's algorithm correctly compute the shortest-path weight $\delta(s, t)$ from s to every vertex t in this graph?

Select one:

- True ✓
 False

For the correctness of Dijkstra, it is sufficient to show that $d[v] = \delta(s, v)$ for every $v \in V$ when v is added to S . Given the shortest $s; v$ path and given that vertex u precedes v on that path, we need to verify that u is in S . If $u = s$, then certainly u is in S . For all other vertices, we have defined v to be the vertex not in S that is closest to s . Since $d[v] = d[u] + w(u, v)$ and $w(u, v) > 0$ for all edges except possibly those leaving the source, u must be in S since it is closer to s than v .

The correct answer is 'True'.

Question 10

Correct

Mark 1.00 out
of 1.00

To implement Dijkstra's shortest path algorithm on unweighted graphs so that it runs in linear time, the data structure to be used is:?

Select one:

- a. Queue ✓
 b. Binary Tree
 c. Stack
 d. Heap

If we use Queue (FIFO) instead of Priority Queue (Min Heap), we get the shortest path in linear time $O(|V| + |E|)$.

The correct answer is: Queue





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◀ Lecture Slides:
Single-Source Shortest
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Completed on Thursday, 1 April 2021, 10:53 PM

Time taken 16 mins 22 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Recurrence equations describing the work done during [recursion](#) are only useful for divide and conquer algorithm analysis

Select one:

- True
 False ✓

The correct answer is 'False'.

Question 2

Correct

Mark 1.00 out of 1.00

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:

(Select the correct attribute)

Select one:

- a. Complexity of the algorithm
 b. Subproblems ✓
 c. [Recursion](#) equation
 d. Divide and conquer strategy

Your answer is correct.

The correct answer is: Subproblems

Question 3

Correct

Mark 1.00 out of 1.00

What are 2 things required in order to successfully use the dynamic programming technique?

Select one:

- a. Divide and conquer
 b. Optimal substructure and overlapping sub-problems ✓
 c. [Recursion](#) and a problem that is complex
 d. A problem that can't be subdivided and is complex
 e. Non-overlapping subproblems and intervals

Your answer is correct.

The correct answer is: Optimal substructure and overlapping sub-problems



**Question 4**

Correct

Mark 1.00 out
of 1.00

Dynamic programming does not work if the subproblems:

Select one:

- a. Cannot be divided in half
- b. Have to be divided too many times to fit into memory
- c. Overlap
- d. Share resources and thus are not independent ✓

Your answer is correct.

The correct answer is: Share resources and thus are not independent

Question 5

Correct

Mark 1.00 out
of 1.00

Every recurrence can be solved using the Master Theorem

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 6

Correct

Mark 1.00 out
of 1.00

The difference between Divide and Conquer and Dynamic Programming is:

Select one:

- a. The division of problems and combination of subproblems
- b. The way we solve the base case
- c. Whether the subproblems overlap or not ✓
- d. The depth of recurrence

Your answer is correct.

The correct answer is: Whether the subproblems overlap or not

Question 7

Correct

Mark 1.00 out
of 1.00

Dynamic Programming is often used for (choose all that apply)

Select one or more:

- a. Subproblems where resources are shared
- b. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓
- c. Problems previously solved using divide and conquer that have overlapping subproblems ✓
- d. Non-polynomial solution problems

Your answer is correct.

The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems



Question 8

Correct

Mark 1.00 out
of 1.00

A divide and conquer approach to solving a problem is useful when

Select one:

- a. The subproblems are overlapping so we don't have to solve them over and over again
- b. The complexity is exponential to solve the entire problem
- c. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓
- d. None of the above

Your answer is correct.

The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size

Question 9

Correct

Mark 1.00 out
of 1.00

Assume we are solving the rod-cutting problem in the book using dynamic programming, and we have a rod of length n that we decide to cut at location

- i. How many subproblems are left after we make this cut
- ii. How many choices do we need to check for each subproblem?

We are trying to find the maximum profit from the rod lengths that we cut.

Select one:

- a. 1 subproblem, up to n choices we have to check ✓
- b. 2 subproblems, n choices we have to check
- c. 3 subproblems, $n-1$ choices to check
- d. No subproblems, we just solve the problem directly

Your answer is correct.

The correct answer is: 1 subproblem, up to n choices we have to check



Question 10

Correct

Mark 1.00 out
of 1.00

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization:

 Dynamic Programming ✓

2. Unweighted shortest simple path in a graph:

 Dynamic Programming ✓

3. Quicksort: Divide and Conquer



4. Longest common subsequence:

 Dynamic Programming ✓

Your answer is correct.

The correct answer is:

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization: [Dynamic Programming]

2. Unweighted shortest simple path in a graph: [Dynamic Programming]

3. Quicksort: [Divide and Conquer]

4. Longest common subsequence: [Dynamic Programming]

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Dashboard My courses In19-S2-CS2022 (112421) 1(b) Introduction to Sorting Quiz 1

Started on Saturday, 19 December 2020, 11:12 PM
State Finished
Completed on Saturday, 19 December 2020, 11:29 PM
Time taken 17 mins 52 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

Standard way of specifying an algorithm is/are
Select one or more:
 a. Class Diagram
 b. Flowcharts ✓
 c. Specifying Steps ✓
 d. Pseudo Code ✓

Your answer is correct.
The correct answers are: Flowcharts, Pseudo Code, Specifying Steps

Question 2
Correct
Mark 100 out of 100

Which of the following is a computational task?
Select one:
 a. What is 54×566 ?
 b. Given a whole number A, is A prime? ✓
 c. What is $85 - 9 + 4$?
 d. All of the Above

Your answer is correct.
The correct answer is: Given a whole number A, is A prime?

Question 3
Correct
Mark 100 out of 100

Finding the location of the element with a given value is:
Select one:
 a. Inserting
 b. Sorting
 c. Search ✓
 d. Merging

Your answer is correct.
The correct answer is: Search

Question 4
Correct
Mark 100 out of 100

Which of the following examples represent the worst case input for an insertion sort?
Select one:
 a. array in sorted order
 b. array sorted in reverse order ✓
 c. normal unsorted array
 d. large array

Your answer is correct.
The correct answer is: array sorted in reverse order

Question 5
Correct
Mark 100 out of 100

The operation of processing each element in the list is known as
Select one:
 a. Inserting
 b. Sorting
 c. Merging
 d. Traversal ✓

Your answer is correct.
The correct answer is: Traversal

Question 6
Correct
Mark 100 out of 100

What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?
Select one:
 a. 5
 b. 20
 c. 10
 d. 15 ✓

Your answer is correct.
The correct answer is: 15

Question 7
Correct
Mark 100 out of 100

A flowchart is a diagram that shows the "flow of control" of an algorithm/a program.
(Fill the blank using the most appropriate word/ phrase)

Your answer is correct.
The correct answer is: flow of control

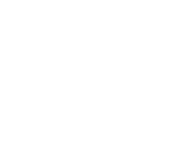
Question 8
Correct
Mark 100 out of 100

What is the result (F) when the input (N) = 4?

Select one:
 a. 150
 b. 50
 c. 24 ✓
 d. 100

Your answer is correct.
The correct answer is: 24

Question 9
Correct
Mark 100 out of 100

The flowchart symbol used to denote Process is
Select one:
 a. 
 b. 
 c. 
 d. 

Your answer is correct.
The correct answer is:

PREVIOUS ACTIVITY [Jump to...](#) **NEXT ACTIVITY** [Lecture Slides: Complexity Analysis](#)

Dashboard My courses in19-S2-CS2022 (I12421) 2(b) Asymptotic Notations Quiz 2

Started on Sunday, 27 December 2020, 1:31 AM
State Finished
Completed on Sunday, 27 December 2020, 2:01 AM
Time taken 29 mins 59 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

What are the factors that affect the running time of a program?
Select one:
 a. CPU speed
 b. Nature of input data set
 c. Memory
 d. All of the above ✓

Your answer is correct.
The correct answer is: All of the above

Question 2
Correct
Mark 100 out of 100

What is the time complexity of the following code?
int a = 0;
for (i = 0; i < N; i++) {
 for (j = N; j > i; j--) {
 a = a + i + j;
 }
}

Select one:
 a. O(N*Sqrt(N))
 b. O(N)
 c. O(N*N) ✓
 d. O(N*log(N))

Your answer is correct.
The correct answer is: O(N*N)

Question 3
Correct
Mark 100 out of 100

Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?
Select one or more:
 a. $O(n^4)$
 b. $O(n^3)$
 c. $\Omega(n^2)$ ✓
 d. $\omega(n^3)$
 e. $O(n^4)$ ✓

Your answer is correct.
The correct answers are: $O(n^4)$, $\Omega(n^2)$

Question 4
Correct
Mark 100 out of 100

For the functions, n^k and c^n , what is the asymptotic relationship between these functions?
Assume that $k \geq 1$ and $c > 1$ are constants
Select one:
 a. n^k is $O(c^n)$ ✓
 b. n^k is $\Theta(c^n)$
 c. n^k is $\Omega(c^n)$

Your answer is correct.
The correct answer is: n^k is $O(c^n)$

Question 5
Correct
Mark 100 out of 100

Let $f(n) = 7n + 8$ and $g(n) = n$, find c (a suitable constant) such that $O(g(n)) = f(n)$ for $n \geq n_0$
Select one:
 a. 7
 b. There is no such constant
 c. 8 ✓

Your answer is correct.
The correct answer is: 8

Question 6
Correct
Mark 100 out of 100

The worst case complexity of Binary search algorithm is
Select one:
 a. $O(n)$
 b. $O(\log(n))$ ✓
 c. $O(n \log(n))$
 d. $O(n^2)$

Your answer is correct.
The correct answer is: $O(\log(n))$

Question 7
Correct
Mark 100 out of 100

Express the function $\frac{n^3}{100} - 100n^2 - 100n + 3$ in terms of Θ -notation.
Select one:
 a. $\Theta(n^3)$
 b. $\Theta(\log(n))$
 c. $\Theta(\sqrt{n})$
 d. $\Theta(n^2)$ ✓

Your answer is correct.
The correct answer is: $\Theta(n^3)$

Question 8
Correct
Mark 100 out of 100

Which of the following case does not exist in complexity theory
Select one:
 a. Null Case ✓
 b. Worst Case
 c. Average Case
 d. Best Case

Your answer is correct.
The correct answer is: Null Case

Question 9
Correct
Mark 100 out of 100

What is the time complexity of the following code?
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
 for (j = 2; j <= N; j = j * 2) {
 k = k + N / 2;
 }
}

Select one:
 a. $O(N)$
 b. $O(N^N)$
 c. $O(N \cdot \text{Sqrt}(N))$
 d. $O(N \cdot \log(N))$ ✓

Your answer is correct.
The correct answer is: $O(N \cdot \log(N))$

Question 10
Correct
Mark 100 out of 100

Select the factors that are considered for analyzing algorithms.
Select one or more:
 a. Amount of memory used ✓
 b. Amount of Memory available
 c. Amount of work done ✓
 d. HDD Space

Your answer is correct.
The correct answers are: Amount of work done, Amount of memory used

PREVIOUS ACTIVITY [Jump to...](#) NEXT ACTIVITY [Lecture Slides : Recursion and Divide and Conquer \(PPTX\)](#)

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[Dashboard](#)[My courses](#)[In19-S2-CS2022 \(12421\)](#)[3\(b\) Introduction to Merge Sort](#)[Quiz 3](#)**Question 1**
Correct
Mark 1.00 out of 1.00

Started on Saturday, 9 January 2021, 8:15 PM
State Finished
Completed on Saturday, 9 January 2021, 8:45 PM
Time taken 29 mins 59 secs
Grade 10.00 out of 10.00 (100%)

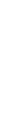


Dashboard

My courses In19-S2-CS2022 (I12421)

4(b) Complexity Analysis - Analyzing Recursion II

Quiz 4



Started on Saturday, 23 January 2021, 7:05 PM

State Finished

Completed on Saturday, 23 January 2021, 7:40 PM

Time taken 35 mins 2 secs

Marks 15.00/15.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

There are n people born between the year 1000 A.D and 2018 A.D, is it possible to sort them by birthdate in $O(n \log(n))$ time.

Select one:

 True ✓ False

Birthdate can be represented in a number format in a database, then we can use Merge Sort to sort them by birthdate.

The correct answer is 'True'.

Question 2

Correct

Mark 1.00 out of 1.00

What is the number of Recursive Calls are made when computing the sum of the list [3,5,4,8,1]?

Select one:

 a. 3 b. 6 c. 4 ✓ d. 5

Your answer is correct.

The correct answer is: 4

Question 3

Correct

Mark 1.00 out of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Guess the form of the solution	Step 1	✓
Solve for constants	Step 3	✓
Verify by induction	Step 2	✓

Your answer is correct.

The correct answer is: Guess the form of the solution → Step 1, Solve for constants → Step 3, Verify by induction → Step 2

Question 4

Correct

Mark 1.00 out of 1.00

Which is/are the method for analyzing time complexity of recurrences?

Select one:

 a. Recurrence Tree Method b. Master Method c. Amortized Method ✓ d. Substitution Method

Your answer is correct.

The correct answer is: Amortized Method

Question 5

Correct

Mark 1.00 out of 1.00

What is/are the best data structure(s) to implement recursive function calls?

Select one or more:

 a. Stack ✓ b. Array c. Linked List ✗ d. Binary Tree

Your answer is correct.

The correct answer is: Stack

Question 6

Correct

Mark 1.00 out of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

 True False ✓

False.

Case 3 of the master theorem applies:

 $f(n) = O(n^{\log_3(3)}) = O(n)$ for $t(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.

Question 7

Correct

Mark 1.00 out of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

 a. It has a double linear time complexity. b. It has a double linear complexity. c. It has a linear time complexity and a linear space complexity. d. It has a linear time complexity. ✓

Your answer is correct.

The correct answer is: It has a linear time complexity.

Question 8

Correct

Mark 1.00 out of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply. $T(n) = 16T(n/4) + n$

Select one:

 a. Master Theorem does not apply. b. $T(n) = \Theta(n \lg n)$ c. $T(n) = \Theta(n^2 \lg n)$ d. $T(n) = \Theta(n^2)$ ✓

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2)$

Question 9

Correct

Mark 1.00 out of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible. $T(n) = 4T(n/2) + n^2\sqrt{n}$

Select one:

 a. $T(n) = \Theta(n^{2.5})$ ✓ b. $T(n) = \Theta(n^3)$ c. $T(n) = \Theta(n)$ d. $T(n) = \Theta(n \log(n))$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{2.5})$

Question 10

Correct

Mark 1.00 out of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible. $T(n) = 2T(n/3) + nlgn$

Select one:

 a. $T(n) = \Theta(n)$ b. $T(n) = \Theta(n \lg n)$ ✓ c. $T(n) = \Theta(n^2 \lg n)$ d. $T(n) = \Theta(\lg n)$ The correct answer is: $T(n) = \Theta(n \lg n)$

Question 11

Correct

Mark 1.00 out of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply. $T(n) = 4T(n/2) + n^2$

Select one:

 a. $T(n) = \Theta(n \lg n)$ b. $T(n) = \Theta(n^2)$ c. Master Theorem does not apply. d. $T(n) = \Theta(n^2 \lg n)$ ✓

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2 \lg n)$

Question 12

Correct

Mark 1.00 out of 1.00

Recursion Tree is one way to analyze recursive functions.

Consider a function with following time complexity.

 $T(n) = T(n/3) + T(2n/3) + n$

Following figure shows the first 3 levels of the recursion tree.

What is/are the number(s) which can appear in the next (4th) level in this recursion tree?

Select one or more:

 a. $16n/27$ b. $n/27$ ✓ c. $2n/27$ ✓ d. $8n/27$ ✓

Your answer is correct.

The correct answers are: $n/27, 2n/27, 8n/27$

Question 13

Correct

Mark 1.00 out of 1.00

Find the solution to following recurrence equation:

 $f(n) = \begin{cases} 1 & \text{if } n=1 \\ 1 + f(\lfloor n/2 \rfloor) & \text{if } n \geq 2 \end{cases}$

Select one:

 a. $f(n) = \lfloor \log(n) \rfloor + 1$ ✓ b. $f(n) = \lfloor \log(n) \rfloor + 1$ c. $f(n) = n \log(n)$ d. $f(n) = \log(n)$ The correct answer is: $f(n) = \lfloor \log(n) \rfloor + 1$

Question 14

Correct

Mark 1.00 out of 1.00

Consider the following sorting algorithm.

NEW-SORT (A, i, j)

 $\text{if } A[i] > A[j]$

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Started on Thursday, 28 January 2021, 11:02 PM
State Finished
Completed on Thursday, 28 January 2021, 11:15 PM
Time taken 13 mins 16 secs
Marks 12.00/12.00
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 1.00 out of 1.00

The procedure LIST-DELETE removes an element x from a linked list L. The procedure must be given a pointer to x, and it then "splices" x out of the list by updating pointers. Choose the correct pseudo code segments.

LIST-DELETE(L,x)

if x.previous != NIL
 x.previous.next = x.next
else L.head = x.next
 if x.next != NIL
 x.next.previous = x.previous

Question 2
Correct
Mark 1.00 out of 1.00

Which one of the following is not a property of an ADT

Select one:
 a. Implementation dependent ✓
 b. Implementation independent
 c. Has set of operations
 d. Has a data specification

The correct answer is: Implementation dependent

Question 3
Correct
Mark 1.00 out of 1.00

How many comparisons needed to search a singly linked list of length n for a given element in the worst case,

Select one:
 a. 2n
 b. n/2
 c. Log2 n - 1
 d. n ✓

The correct answer is: n

Question 4
Correct
Mark 1.00 out of 1.00

Choose the output of the following code segment on python list:
A=[1,2,3,4,5,6,7,8,9]
A[::2]=[10,20,30,40,50,60]
Print(A)

Select one:
 a. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
 b. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]
 c. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓
 d. [1, 2, 10, 20, 30, 40, 50, 60]

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5

Question 5
Correct
Mark 1.00 out of 1.00

Which of the following is not a data structure

Select one:
 a. Record
 b. Array
 c. Variable ✓
 d. Dictionary

The correct answer is: Variable

Question 6
Correct
Mark 1.00 out of 1.00

Which of the following statements are correct regarding implementing data structures

Select one or more:
 a. A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking O(1) time ✓
 b. A stack can be implemented using a singly linked list with the operations PUSH and POP still taking O(1) time ✓
 c. A stack can be implemented using two queues. ✓
 d. A queue can be implemented using two stacks. ✓

Your answer is correct.

The correct answers are: A stack can be implemented using a singly linked list with the operations PUSH and POP still taking O(1) time, A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking O(1) time, A queue can be implemented using two stacks., A stack can be implemented using two queues.

Question 7
Correct
Mark 1.00 out of 1.00

Choose a statement about stacks that is not correct?

Select one:
 a. Stack is a FIFO data structure ✓
 b. Linked list are used for implementing stacks
 c. Pop and push are the primary operations used in stacks
 d. Top of the stack always contains the latest item

The correct answer is: Stack is a FIFO data structure

Question 8
Correct
Mark 1.00 out of 1.00

Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

Select one:
 a. Deleting a node whose location is given ✓
 b. Traversing a list to process each node
 c. Searching of an unsorted list for a given item
 d. Inverting a node after the node with given location

Your answer is correct.

The correct answer is: Deleting a node whose location is given

Question 9
Correct
Mark 1.00 out of 1.00

Which of the following statement is wrong regarding Python lists and arrays.

Select one:
 a. Both can be indexed and iterated through
 b. Both can be sliced
 c. A Python array with numbers can be divided by a certain number while doing same on python list will result in Type error.
 d. All statements are correct ✓

Your answer is correct.

The correct answer is: All statements are correct

Question 10
Correct
Mark 1.00 out of 1.00

Consider the following operation performed on a stack of size 5.
Push();
Pop();
Push(2);
Push(3);
Pop();
Push(4);
Pop();
Pop();
Push(5);

After the completion of all operation, the number of elements present in stack are

Select one:
 a. 1 ✓ Number of elements present in stack is equal to the difference between number of push operations and number of pop operations. Number of elements is 5-4=1.
 b. 4
 c. 2
 d. 3

Your answer is correct.

The correct answer is: 1

Question 11
Correct
Mark 1.00 out of 1.00

Which of the following is/are advantages of abstract data types(ADT)

Select one:
 a. ADT abstracts away from a specific representation to focus on the semantic meaning of the data
 b. An ADT may have different implementations of it with different performance characteristics. So for different use cases, specific implementations of an ADT that will be more efficient for that use case can be used.
 c. When an ADT is used in a program, most of the program becomes independent of that abstract data type's representation, so that representation can be improved without breaking the entire program.
 d. All are correct ✓

Your answer is correct.

The correct answer is: All are correct

Question 12
Correct
Mark 1.00 out of 1.00

In linked list implementation of queue, if only front pointer is maintained, which of the following operation take worst case linear time?

Select one:
 a. To empty a queue
 b. Both Insertion and To empty a queue ✓ Since front pointer is used for deletion, so worst time for the other two cases.
 c. Deletion
 d. Insertion

Your answer is correct.

The correct answer is: Both Insertion and To empty a queue

PREVIOUS ACTIVITY [Lecture Slides: Basic Data Structures](#) Jump to... NEXT ACTIVITY [Lecture Slides: Basic Data Structures](#)

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Started on Monday, 15 February 2021, 9:32 PM
State Finished
Completed on Monday, 15 February 2021, 10:02 PM
Time taken 30 mins 1 sec
Grade 9.50 out of 10.00 (95%)

Question 1
Correct
Mark 1.00 out of 1.00

By which Factor does the Binary Search Narrows the Search?

Select one:

a. Four (4) times at each iteration
 b. Does not narrow the search by any factor
 c. Two (2) times at each iteration ✓
 d. Two (2) times at each search operation

The correct answer is: Two (2) times at each iteration

Question 2
Correct
Mark 1.00 out of 1.00

For the set of {1, 4, 5, 10, 16, 17, 21} of keys, many different binary search trees can be built. Which of the following can be their possible heights

Select one or more:

a. 2 ✓
 b. 6 ✓
 c. 7
 d. 3 ✓

Your answer is correct.

The correct answers are: 2, 3, 6

Question 3
Correct
Mark 1.00 out of 1.00

Suppose that we have numbers between 1 and 1000 in a binary search tree, and we want to search for the number 363. Which of the following sequences could not be the sequence of nodes examined?

Select one:

a. 924, 220, 911, 244, 898, 258, 362, 363
 b. 2, 399, 387, 219, 266, 382, 381, 278, 363
 c. 925, 202, 911, 240, 912, 245, 363 ✓
 d. 2, 252, 401, 398, 330, 344, 397, 363

Your answer is correct.

The correct answer is: 925, 202, 911, 240, 912, 245, 363

Question 4
Correct
Mark 1.00 out of 1.00

What is the number of internal nodes of a complete k-ary tree?

Select one:

a. $(k^h - 1)/k$
 b. $(h^k - 1)/(h - 1)$
 c. $k^{(h-1)}$
 d. $(k^h - 1)/(k - 1)$ ✓

Your answer is correct.

The correct answer is: $(k^h - 1)/(k - 1)$

Question 5
Correct
Mark 1.00 out of 1.00

Consider numbers 3, 9, 1, 17, 14, 22, 20. These numbers are inserted in to a balanced binary tree. Which tree traversal method would output the following sequence.
14, 3, 1, 9, 20, 17, 22

Select one:

a. Inorder
 b. Postorder
 c. Preorder ✓
 d. Non of the above

The correct answer is: Preorder

Question 6
Correct
Mark 1.00 out of 1.00

What is the running time of Linear Search when all the elements in a list are sorted?
n = Number of Elements in List

Select one:

a. $O(n)$ ✓
 b. $O(\log(n))$
 c. $O(n \log(n))$
 d. $O(n^2)$

The correct answer is: $O(n)$

Question 7
Correct
Mark 1.00 out of 1.00

Which of the following binary trees are BSTs?

(1) A / \	(2) 10 /	(3) cat / \	(4) 15 / \
B	C	bat	rat
		/	/
		-3	ant
			20
			30

Select one:

a. 2,4
 b. 2,3 ✓
 c. 1,4
 d. None of these

Your answer is correct.

The correct answer is: 2,3

Question 8
Partially correct
Mark 0.50 out of 1.00

Which of the following statement(s) is/are correct regarding a binary search tree?

Select one or more:

a. Basic operations on any randomly built binary search tree take time proportional to the height of the tree. ✓
 b. The expected height of a randomly built binary search tree is $O(\lg n)$. ✓
 c. It takes $O(\lg n)$ time to walk an n-node binary search tree.
 d. Basic operations on any randomly built binary search tree take $O(\lg n)$ time. ✗

Your answer is partially correct.

You have selected too many options.

The correct answers are: The expected height of a randomly built binary search tree is $O(\lg n)$, Basic operations on any randomly built binary search tree take time proportional to the height of the tree.

Question 9
Correct
Mark 1.00 out of 1.00

In a pre-order traversal of a binary search tree, the first item printed out is always the smallest one.

Select one:

a. True
 b. False ✓

The correct answer is 'False'.

Question 10
Correct
Mark 1.00 out of 1.00

Select whether the following statement is True/False.
Binary Search is appropriate for linked lists

Select one:

a. True
 b. False ✓

The correct answer is 'False'.

PREVIOUS ACTIVITY
◀ Lecture Slides: Binary Search Trees Jump to... NEXT ACTIVITY
Zeetings : L6 Binary Search Trees ►

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Dashboard My courses in19-S2-CS2022 (I12421) 7(b) Heapsort Quiz 7

Started on Saturday, 20 February 2021, 10:50 PM
State Finished
Completed on Saturday, 20 February 2021, 11:01 PM
Time taken 10 mins 40 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

What is the worst-time complexity of BUILDHEAP operation?

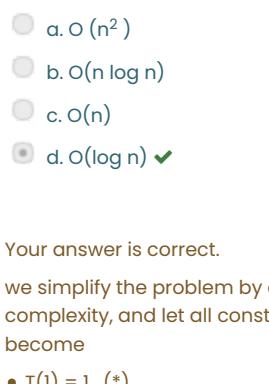
Select one:

a. $O(n^2)$
 b. $O(\log(n))$
 c. $O(n)$ ✓
 d. $O(n \log(n))$

The correct answer is: $O(n)$

Question 2
Correct
Mark 100 out of 100

If we implement heap as Max-Heap, adding a new node of value 15 to the leftmost node of the right sub tree. What value will be at leaf nodes of the right sub tree of the heap?



Select one:

a. 2 and 3
 b. 3 and 1
 c. 15 and 1 ✓
 d. 25 and 1

The correct answer is: 15 and 1

Question 3
Correct
Mark 100 out of 100

What is the time complexity of following algorithm which is created to return the smallest index i at which $x \leq a[i]$ for a given array?

```
func Search(a []int, x int) int {
    switch len(a) {
    case 0:
        return 0
    case 1:
        if x <= a[0] {
            return 0
        }
        return 1
    }
    mid := 1 + (len(a)-1)/2
    if x <= a[mid-1] {
        return Find(a[:mid], x)
    }
    return mid + Find(a[mid:], x)
}
```

Select one:

a. $O(n^2)$
 b. $O(n \log n)$
 c. $O(n)$
 d. $O(\log n)$ ✓

Your answer is correct.
we simplify the problem by only computing the asymptotic time complexity, and let all constants be 1. Then the recurrences become

- $T(1) = 1$, (*)
- $T(n) = 1 + T(n/2)$, when $n > 1$.

it's possible to find a solution by repeated substitution.

```
T(n) = (*)  
1 + T(n/2) = (**)  
1 + (1 + T(n/4)) = 2 + T(n/4) = (**)  
2 + (1 + T(n/8)) = 3 + T(n/8) = ...  
k + T(n/2^k) = ...  
log n + T(n/2^{\log n}) = log n + T(1) = (*)  
log n + 1 = O(\log n).
```

The correct answer is: $O(\log n)$

Question 4
Correct
Mark 100 out of 100

Consider a binary min heap containing n elements and every node is having degree 2 (i.e. full binary min heap tree). What is the probability of finding the largest element at the last level?

Select one:

a. 1/2
 b. $1/2^n$
 c. 1 ✓
 d. $1/n$

Your answer is correct.
The correct answer is: 1

Question 5
Correct
Mark 100 out of 100

Heap Data Structure is an Array Object that can be Viewed as a Complete Binary Tree

Your answer is correct.
Heap Data Structure is an Array Object that can be Viewed as a [[1]]

The correct answer is:
Heap Data Structure is an Array Object that can be Viewed as a [Complete Binary Tree]

Question 6
Correct
Mark 100 out of 100

What is the worst-time complexity of HEAPSORT operation?

Select one:

a. $O(n^2)$
 b. $O(\log(n))$
 c. $O(n \log(n))$ ✓
 d. $O(n)$

The correct answer is: $O(n \log(n))$

Question 7
Correct
Mark 100 out of 100

Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28

How many heapify operations have been performed on root of heap?

Select one:

a. 1
 b. 3 or 4
 c. 2 ✓
 d. 5 or 6

Your answer is correct.
The correct answer is: 2

Question 8
Correct
Mark 100 out of 100

What is the worst-time complexity of Heapinsert operation?

Select one:

a. $O(n \log(n))$
 b. $O(n^2)$
 c. $O(\log(n))$ ✓
 d. $O(n)$

The correct answer is: $O(\log(n))$

Question 9
Correct
Mark 100 out of 100

```
BUILD-MIN-HEAP(A)
A.heapsize = A.length
for i = A.length/2 down to 1
    MIN-HEAPIFY(A, i)
```

Running time for the "MIN-HEAPIFY" operation is $O(\log n)$. What is the time complexity of "BUILD-MIN-HEAP" operation?

Select one:

a. $O(\log n^2)$
 b. $O(n)$ ✓
 c. $O(n \log n)$
 d. $O(n^2 \log n)$

Your answer is correct.
<https://www.growingtheweb.com/data-structures/binary-heap/build-heap-proof/>
The correct answer is: $O(n)$

Question 10
Correct
Mark 100 out of 100

Which of the following sorting algorithms has the least worst-case running time?

Select one or more:

a. Merge Sort ✓
 b. Heapsort ✓
 c. Insertion Sort
 d. Bubble Sort

The correct answers are: Merge Sort, Heapsort

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Dashboard My courses in19-S2-CS2022 (I12421) 8(b) Hash Tables II Quiz 8

Started on Saturday, 6 March 2021, 9:33 PM
State Finished
Completed on Saturday, 6 March 2021, 9:42 PM
Time taken 8 mins 50 secs
Grade 9.00 out of 10.00 (90%)

Question 1
Correct
Mark 100 out of 100

Best methods used in collision handling is/are
Select one or more:
 a. Chaining ✓
 b. Double hashing ✓
 c. Quadratic probing
 d. Linear probing

The correct answers are: Chaining, Double hashing

Question 2
Correct
Mark 100 out of 100

A hash function is
Select one:
 a. A function that creates an array
 b. A function with allocated memory to keys
 c. None of the mentioned
 d. A function that computes the location of the key in the array ✓

The correct answer is: A function that computes the location of the key in the array

Question 3
Correct
Mark 100 out of 100

Which index will the character 'a' hash to in a Hash Table with $M = 7$, with $H(k) = k \% M$ (where we use key k 's ASCII value in the mod operation), and where we are using 0-based indexing?
Hint- ASCII value of 'a' is 97

Answer: 6 ✓

The correct answer is: six

Question 4
Correct
Mark 100 out of 100

Hash table is?
Select one:
 a. A structure that maps values to keys
 b. A structure used to implement stack and queue
 c. A structure used for storage
 d. A structure that maps keys to values ✓

The correct answer is: A structure that maps keys to values

Question 5
Correct
Mark 100 out of 100

Using the collision resolution strategy of Linear Probing, fill in the missing elements in the Hash Table, where $H(k) = k \% M$ and $M = 5$, after executing all the operations shown below.

Insert: 5
Insert: 10
Insert: 11
Insert: 12
Insert: 13

0	1	2	3	4
?	?	?	?	?

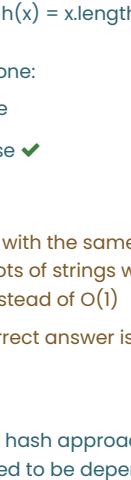
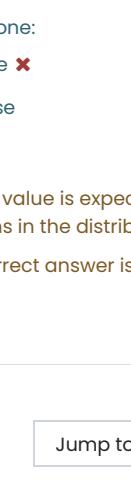
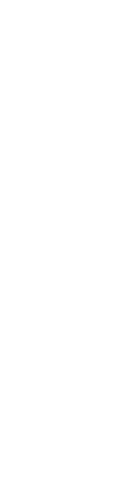
Write your answer as comma separated values with no spaces.
Eg - 5,11,10,12,13

Answer: 5,10,11,12,13 ✓

The correct answer is: 5,10,11,12,13

Question 6
Correct
Mark 100 out of 100

The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?

Select one:
 a. 
 b. 
 c. 
 d. 

Your answer is correct.

The correct answer is: i and ii only

Question 7
Correct
Mark 100 out of 100

Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function $x \bmod 10$, which of the following statements are true?
i. 9679, 1989, 4199 hash to the same value
ii. 1471, 6171 has to the same value
iii. All elements hash to the same value
iv. Each element hashes to a different value

Select one:
 a. iii or iv
 b. ii only
 c. i only
 d. i and ii only ✓

Your answer is correct.

The correct answer is: i and ii only

Question 8
Correct
Mark 100 out of 100

Calculate $P_{3,5}(\geq 1 \text{ collision})$.
Hint: $P_{N,M}(\geq 1 \text{ collision}) = 1 - P_{N,M}(\text{no collision})$
Where N is number of insertions and M is no of slots
Input your answer in decimal form and round to the nearest 2 digits

Answer: 0.52 ✓

3 insertions into 5 slots
 $P(\text{no collision 1st}) = 1$, all slots empty
 $P(\text{no collision 2nd}) = 4/5$, 1 slot filled
 $P(\text{no collision 3rd}) = 3/5$, 2 slots filled
thus $P(\text{no collisions}) = (1/4)(3/5) = 0.48$
 $P(\geq 1 \text{ collision}) = 1 - P(\text{no collisions}) = 1 - 0.48 = 0.52$

The correct answer is: 0.52

Question 9
Correct
Mark 100 out of 100

Possible hash function to store string in hash table is the string's length, $h(x) = x.\text{length}$. This a good hash function.

Select one:
 a. True ✗
 b. False ✓

Strings with the same length will have the same hash code. If we insert lots of strings with the same length, lookup will take $O(n)$ time instead of $O(1)$
The correct answer is 'False'.

Question 10
Incorrect
Mark 0.00 out of 100

A good hash approach is to derive the hash value that is expected to be dependent on any patterns that might exist in the data.

Select one:
 a. True ✗
 b. False

A hash value is expected to be unrelated or independent of any patterns in the distribution of keys.
The correct answer is 'False'.

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Dashboard My courses in19-S2-CS2022 (112421) 9(a) Graphs: Introduction Quiz 9

Started on Wednesday, 24 March 2021, 8:27 PM
State Finished
Completed on Wednesday, 24 March 2021, 8:48 PM
Time taken 20 mins 45 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

Find the output of Depth-First search of the following tree using pre-order traversal :

Select one:

- a. 3 5 6 4 1 7 9 11 12 10 8 2 0
- b. 0 1 3 4 5 6 2 7 8 9 10 11 12 ✓
- c. 3 1 5 4 6 0 7 2 9 8 11 10 12
- d. 0 1 2 3 4 7 8 5 6 9 10 11 12

Your answer is correct.
The correct answer is: 0 1 3 4 5 6 2 7 8 9 10 11 12

Question 2
Correct
Mark 100 out of 100

Find the output of Depth-First search of the following tree using Post-order traversal:

Select one:

- a. 3 1 5 4 6 0 7 2 9 8 11 10 12
- b. 0 1 2 3 4 7 8 5 6 9 10 11 12
- c. 3 5 6 4 1 7 9 11 12 10 8 2 0 ✓
- d. 0 1 3 4 5 6 2 7 8 9 10 11 12

Your answer is correct.
The correct answer is: 3 5 6 4 1 7 9 11 12 10 8 2 0

Question 3
Correct
Mark 100 out of 100

Breadth First Search is equivalent to which of the traversals in the Binary Trees?

Select one:

- a. Pre-order Traversal
- b. Post-order Traversal
- c. In-order Traversal
- d. None of the above ✓

Your answer is correct.
The correct answer is: None of the above

Question 4
Correct
Mark 100 out of 100

Which of the following data structure is used to implement DFS?

Select one:

- a. Linked list
- b. Queue
- c. Tree
- d. Stack ✓

Your answer is correct.
The correct answer is: Stack

Question 5
Correct
Mark 100 out of 100

The Data structure used in standard implementation of Breadth First Search is?

Select one:

- a. Queue ✓
- b. Linked List
- c. Stack
- d. Tree

Your answer is correct.
The correct answer is: Queue

Question 6
Correct
Mark 100 out of 100

Find an output of Depth-First traversal of the following graph starting from node 1:

Select one:

- a. 1 3 7 4 2 5
- b. 1 3 7 2 4 5
- c. 1 3 2 5 4 7 ✓
- d. 1 7 3 4 2 5

Your answer is correct.
The correct answer is: 1 3 2 5 4 7

Question 7
Correct
Mark 100 out of 100

Pseudo codes for Breadth First Search(BFS) and Depth First Search(DFS) which look alike except one line is given below. Select the correct pseudo code segments for STATEMENT 1 and STATEMENT 2.

```
BFS(G)
{
    list L = empty
    tree T = empty
    choose a starting vertex x
    search(x)
    while(L nonempty)
        STATEMENT 1
        if w not yet visited
            add (v,w) to T
            search(w)
        }
    }

DFS(G)
{
    list L = empty
    tree T = empty
    choose a starting vertex x
    search(x)
    while(L nonempty)
        STATEMENT 2
        if w not yet visited
            add (v,w) to T
            search(w)
        }
    }

search(vertex v)
{
    visit(v)
    for each edge (v,w)
        add edge (v,w) to end of L
}
```

STATEMENT 2 remove edge (v,w) from end of L ✓
STATEMENT 1 remove edge (v,w) from start of L ✓

Your answer is correct.
<https://www.ics.uci.edu/~eppstein/161/960215.html>

Both of these search algorithms keep a list of edges to explore; the only difference between the two is that, while both algorithms adds items to the end of L, BFS removes them from the beginning, which results in maintaining the list as a queue, while DFS removes them from the end, maintaining the list as a stack.

The correct answer is: STATEMENT 2 → remove edge (v,w) from end of L, STATEMENT 1 → remove edge (v,w) from start of L

Question 8
Correct
Mark 100 out of 100

The degree of a vertex of a graph is the number of edges that are incident to the vertex. Which of the following statement(s) is/are true regarding degree of vertices of a undirected graph?

Select one or more:

- a. Sum of degrees of all vertices = 2 * Total number of edges ✓
- b. A graph can exist such that its total number of vertices is 25 and all the vertices are connected with exactly 7 other vertices
- c. Total number of vertices with odd number of degrees is even. ✓
- d. Total number of vertices with even number of degrees is odd

Your answer is correct.
The correct answers are: Total number of vertices with odd number of degrees is even., Sum of degrees of all vertices = 2 * Total number of edges

Question 9
Correct
Mark 100 out of 100

Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures

Depth first search	Stack	✓
Sorting	Heap	✓
Breadth first search	Queue	✓

Your answer is correct.
Among the given choices, queue is the most appropriate for BFS, stack for DFS and heap for sorting

The correct answer is: Depth first search → Stack, Sorting → Heap, Breadth first search → Queue

Question 10
Correct
Mark 100 out of 100

Consider following statement and state it is true or false

A DFS of a directed graph always produces the same number of tree edges, i.e. independent of the order in which the vertices are considered for DFS.

Select one:

- a. True
- b. False ✓

a-----> b
If you start from a , one tree edge
If you start from b,no tree edge

The correct answer is 'False'.

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Dashboard My courses [IN19-S2-CS2022 \(II2421\)](#) Minimum Spanning Trees Quiz 10

Started on Saturday, 27 March 2021, 11:05 PM
State Finished
Completed on Saturday, 27 March 2021, 11:20 PM
Time taken 14 mins 54 secs
Grade 10.00 out of 10.00 (100%)

Question 1 Correct Mark 100 out of 100

State True/False.
MST for a given graph is unique.

Select one:
 a. True
 b. False ✓

The correct answer is 'False'.

Question 2 Correct Mark 100 out of 100

Match the edges with the appropriate type of edge.

Red Edge (2)	Cross Edge	✓
Blue Edge (3)	Forward Edge	✓
Black Edges (4)	Tree Edge	✓
Green Edge (1)	Back Edge	✓

The correct answer is: Red Edge (2) → Cross Edge, Blue Edge (3) → Forward Edge, Black Edges (4) → Tree Edge, Green Edge (1) → Back Edge

Question 3 Correct Mark 100 out of 100

Consider the following statements regarding spanning trees and minimum spanning trees

A) A graph can have more than one spanning tree
B) A weighted graph can have more than one minimum spanning tree

Select one:
 a. Both A and B are false
 b. Both A and B are true ✓
 c. Only B is true
 d. Only A is true

Your answer is correct.

The correct answer is: Both A and B are true

Question 4 Correct Mark 100 out of 100

Select the two basic properties of Spanning Tree.

Select one or more:
 a. Cyclic
 b. Connected ✓
 c. Not Connected
 d. Acyclic ✓

The correct answers are: Connected, Acyclic

Question 5 Correct Mark 100 out of 100

Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. W_{ij} entry in the matrix W below is the weight of the edge [i, j].

In the graph given, what is the minimum possible weight of a path P from vertex 1 to vertex 2 in this graph such that P contains at most 3 edges?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:
 a. 9
 b. 7
 c. 10
 d. 8 ✓

The correct answer is: 8

Question 6 Correct Mark 100 out of 100

An undirected graph G has n nodes. Its adjacency matrix is given by an $n \times n$ square matrix whose (i) diagonal elements are 0's and (ii) non-diagonal elements are 1's.

Which one of the following is TRUE?

Select one:
 a. Graph G has no minimum spanning tree (MST)
 b. Graph G has a unique MST of cost $n-1$
 c. Graph G has multiple spanning trees of different costs
 d. Graph G has multiple distinct MSTs, each of cost $n-1$ ✓

The correct answer is: Graph G has multiple distinct MSTs, each of cost $n-1$

Question 7 Correct Mark 100 out of 100

Consider a weighted complete graph G on the vertex set V_1, V_2, \dots, V_n such that the weight of the edge (V_i, V_j) is $2|i - j|$. The weight of a minimum spanning tree of G is:

Select one:
 a. $n - 1$
 b. n^2
 c. $2n - 2$ ✓
 d. nC_2

The correct answer is: $2n - 2$

Question 8 Correct Mark 100 out of 100

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes (V_i, V_j) are connected if and only if $|i-j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $|i-j|$. A sample graph with $n=4$ is shown below.

What is the length of the path from V_5 to V_6 in the MST of the above graph with $n = 10$?

Select one:
 a. 31 ✓
 b. 25
 c. 41
 d. 11

The correct answer is: 31

Question 9 Correct Mark 100 out of 100

Select all valid spanning trees of the graph below

A)

B)

C)

Select one:
 a. B only ✓
 b. All A,B and C
 c. It depends on the weight of the edges
 d. Both B and C

Your answer is correct.

The correct answer is: B only

Question 10 Correct Mark 100 out of 100

A maximum spanning tree is a spanning tree with weight greater than or equal to the weight of every other spanning tree. A student claims that such a tree can be found with algorithms such as Prim's or Kruskal's after multiplying the edge weights by -1 and solving the MST problem on the new graph. His/Her claim is

Select one:
 a. True ✓
 b. False

The correct answer is 'True'.

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Dashboard My courses in19-S2-CS2022 (I12421) II(b) Single-Source Shortest Path II Quiz 11

Started on Wednesday, 7 April 2021, 10:26 PM
State Finished
Completed on Wednesday, 7 April 2021, 10:35 PM
Time taken 9 mins 12 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

What is the time complexity of Dijkstra's shortest path algorithm?
Select one:
 a. O(|E| |V|)
 b. O(|V|)
 c. O(|E| log |V|) ✓
 d. O(|V|^2)

Your answer is correct.
The correct answers are: O(|E| log |V|), O(|V|^2)

Question 2
Correct
Mark 100 out of 100

The Relaxation process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.
Your answer is correct.
The correct answer is:
The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Question 3
Correct
Mark 100 out of 100

What is the worst case space complexity of Bellman Ford algorithm?
Select one:
 a. O(|E|)
 b. O(|E| |V|)
 c. O(|V|) ✓
 d. O(|V|^2)

The correct answer is: O(|V|)

Question 4
Correct
Mark 100 out of 100

Run Dijkstra's algorithm on the following directed graph, starting at vertex S. What is the order in which vertices get removed from the priority queue?

Select one:
 a. S, A, C, F, D, E, B
 b. B, A, C, F, D, E, S
 c. S, C, A, D, F, E, B ✓
 d. F, S, A, C, D, E, B

Your answer is correct.
The correct answer is: S, C, A, D, F, E, B

Question 5
Correct
Mark 100 out of 100

What are the suitable algorithms each of these scenarios?
1. For graphs where the edge-weights are either zero or all same. - Breadth First Search ✓
2. For graphs where the edge-weights are non-negative. - Dijkstra's Algorithm ✓
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists.
- Bellman-Ford Algorithm ✓

Your answer is correct.
The correct answer is:
What are the suitable algorithms each of these scenarios?
1. For graphs where the edge-weights are either zero or all same. - [Breadth First Search]
2. For graphs where the edge-weights are non-negative. - [Dijkstra's Algorithm]
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists.
- [Bellman-Ford Algorithm]

Question 6
Correct
Mark 100 out of 100

If all edges have the same weight in an undirected graph, which algorithm will find the shortest path between two nodes more efficiently?
Select one:
 a. Bellman-Ford
 b. Breadth-First Search ✓
 c. Dijkstra
 d. Depth-First Search

Breadth-First Search has time complexity O(|V| + |E|).
The correct answer is: Breadth-First Search

Question 7
Correct
Mark 100 out of 100

For what cases can we apply Bellmann Ford algorithm?
Select one or more:
 a. Directed and weighted graphs ✓
 b. Undirected and unweighted graphs
 c. All directed graphs
 d. Undirected and weighted graphs

Your answer is correct.
The correct answer is: Directed and weighted graphs

Question 8
Correct
Mark 100 out of 100

Given a graph G = (V,E) with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.
Select one:
 a. True ✓
 b. False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.
The correct answer is 'True'.

Question 9
Correct
Mark 100 out of 100

To implement Dijkstra's shortest path algorithm on unweighted graphs so that it runs in linear time, the data structure to be used is?:
Select one:
 a. Binary Tree
 b. Heap
 c. Queue ✓
 d. Stack

If we use Queue (FIFO) instead of Priority Queue (Min Heap), we get the shortest path in linear time O(|V| + |E|).
The correct answer is: Queue

Question 10
Correct
Mark 100 out of 100

A graph can have a negative weight cycle when?
Select one:
 a. The graph has a cycle
 b. The graph has 1 or more negative weighted edges
 c. The total weight of the graph is negative ✓
 d. The graph has 1 negative weighted edge

Your answer is correct.
When the total weight of the graph sums up to a negative number then the graph is said to have a negative weight cycle. Bellmann Ford Algorithm provides no solution for such graphs.
The correct answer is: The total weight of the graph is negative

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Started on Thursday, 1 April 2021, 11:25 PM
State Finished
Completed on Thursday, 1 April 2021, 11:41 PM
Time taken 15 mins 56 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 100 out of 100

Dynamic programming does not work if the subproblems:
Select one:
 a. Share resources and thus are not independent ✓
 b. Overlap
 c. Have to be divided too many times to fit into memory
 d. Cannot be divided in half

Your answer is correct.
The correct answer is: Share resources and thus are not independent

Question 2
Correct
Mark 100 out of 100

Dynamic Programming is often used for (choose all that apply)
Select one or more:
 a. Non-polynomial solution problems
 b. Problems previously solved using divide and conquer that have overlapping subproblems ✓
 c. Subproblems where resources are shared
 d. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓

Your answer is correct.
The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems

Question 3
Correct
Mark 100 out of 100

What are 2 things required in order to successfully use the dynamic programming technique?
Select one:
 a. Non-overlapping subproblems and intervals
 b. Recursion and a problem that is complex
 c. Optimal substructure and overlapping sub-problems ✓
 d. Divide and conquer
 e. A problem that can't be subdivided and is complex

Your answer is correct.
The correct answer is: Optimal substructure and overlapping sub-problems

Question 4
Correct
Mark 100 out of 100

Recurrence equations describing the work done during recursion are only useful for divide and conquer algorithm analysis
Select one:
 a. True
 b. False ✓

The correct answer is 'False'.

Question 5
Correct
Mark 100 out of 100

A divide and conquer approach to solving a problem is useful when
Select one:
 a. The subproblems are overlapping so we don't have to solve them over and over again
 b. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓
 c. None of the above
 d. The complexity is exponential to solve the entire problem

Your answer is correct.
The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size

Question 6
Correct
Mark 100 out of 100

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:
(Select the correct attribute)

Select one:
 a. Complexity of the algorithm
 b. Divide and conquer strategy
 c. Subproblems ✓
 d. Recursion equation

Your answer is correct.
The correct answer is: Subproblems

Question 7
Correct
Mark 100 out of 100

The difference between Divide and Conquer and Dynamic Programming is:
Select one:
 a. The depth of recurrence
 b. The way we solve the base case
 c. The division of problems and combination of subproblems
 d. Whether the subproblems overlap or not ✓

Your answer is correct.
The correct answer is: Whether the subproblems overlap or not

Question 8
Correct
Mark 100 out of 100

Every recurrence can be solved using the Master Theorem
Select one:
 a. True
 b. False ✓

The correct answer is 'False'.

Question 9
Correct
Mark 100 out of 100

The matrix-chain multiply problem for a chain of matrix multiplications $A_1 \dots A_n$ in the book is an example of a dynamic programming problem. Consider the subchain $A_i \ A_{i+1} \dots A_j$. The problem is to minimize the cost of the multiplication (in terms of the number of required scalar multiplications) by choosing where to parenthesize the chain. In this case choosing where to split the chain and parenthesize it results in how many subproblems and how many choices for each subproblem?

Select one:
 a. 2 subproblems, and $j-i$ choices for each ✓
 b. 2 subproblems, $n-i$ choices for each
 c. 1 subproblem, $n-j$ choices
 d. 1 subproblem, j choices

Your answer is correct.
The correct answer is: 2 subproblems, and $j-i$ choices for each

Question 10
Correct
Mark 100 out of 100

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization:
 a. Dynamic Programming ✓

2. Unweighted shortest simple path in a graph:
 b. Dynamic Programming ✓

3. Quicksort:
 c. Divide and Conquer ✓

4. Longest common subsequence:
 d. Dynamic Programming ✓

Your answer is correct.
The correct answer is:
Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization: [Dynamic Programming]
2. Unweighted shortest simple path in a graph: [Dynamic Programming]
3. Quicksort: [Divide and Conquer]
4. Longest common subsequence: [Dynamic Programming]

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Started on Saturday, 19 December 2020, 7:26 PM

State Finished

Completed on Saturday, 19 December 2020, 7:43 PM

Time taken 16 mins 40 secs

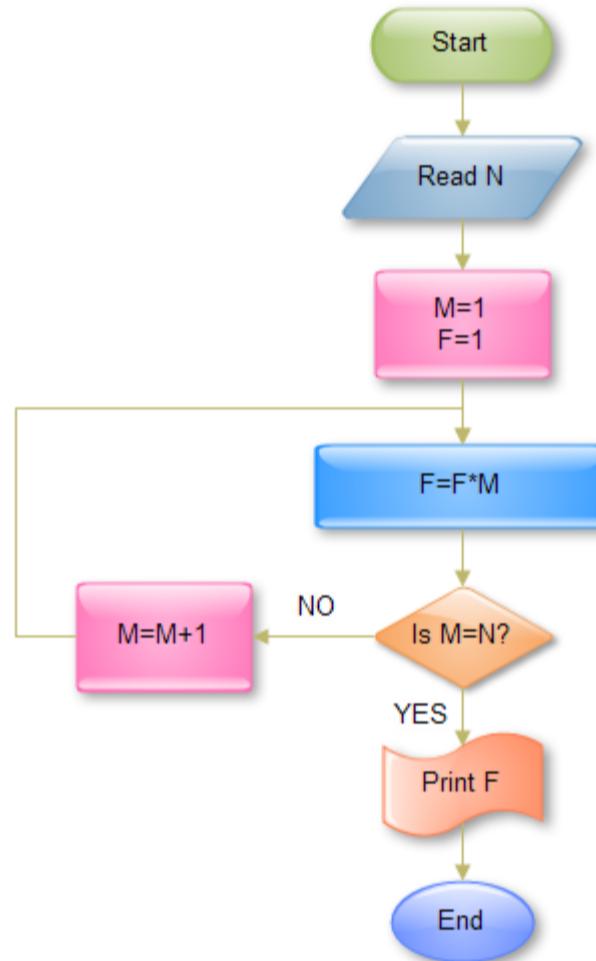
Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

What is the result (F) when the input (N) = 5?



Select one:

- a. 120 ✓
- b. 50
- c. 150
- d. 100

Your answer is correct.

The correct answer is: 120



**Question 2**

Correct

Mark 1.00 out
of 1.00**What is an Algorithm?****Select one:**

- a. A way to solve a problem
- b. A step by step method of solving a computational task ✓
- c. A step by step method of solving a task
- d. A computer program

Your answer is correct.**The correct answer is: A step by step method of solving a computational task****Question 3**

Correct

Mark 1.00 out
of 1.00**What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?****Select one:**

- a. 5
- b. 20
- c. 15 ✓
- d. 10

Your answer is correct.**The correct answer is: 15****Question 4**

Correct

Mark 1.00 out
of 1.00**Which of the following examples represent the worst case input for an insertion sort?****Select one:**

- a. array sorted in reverse order ✓
- b. normal unsorted array
- c. large array
- d. array in sorted order

Your answer is correct.**The correct answer is: array sorted in reverse order**

Question 5

Correct

Mark 1.00 out
of 1.00

Following pseudocode is used to sort a list using bubble sort.
What is the missing code segment (indicated as <missing>)?

```
BUBBLE-SORT(A)
do
    swapped = false
    for i = 2 to A.length
        if A[i-1] > A[i]
            temp = A[i]
            <missing>
            swapped = true
    while swapped
```



Select one:

 a.

```
A[i] = A[i-1]
A[i-1] = temp ✓
```

 b.

```
A[i] = A[i+1]
A[i-1] = temp
```

 c.

```
A[i] = A[i-1]
A[i+1] = temp
```

 d.

```
A[i-1] = A[i]
i = i+1
```

Your answer is correct.

The correct answer is:

```
A[i] = A[i-1]
A[i-1] = temp
```

Question 6

Correct

Mark 1.00 out
of 1.00

Which of the following is a computational task?

Select one:

 a. What is $2+5$? b. Given a whole number A, is A prime? ✓ c. What is the remainder when 5 divided by 2 ? d. All of the Above

Your answer is correct.

The correct answer is: Given a whole number A, is A prime?



**Question 7**

Correct

Mark 1.00 out
of 1.00

Finding the location of the element with a given value is:

Select one:

- a. Inserting
- b. Merging
- c. Search ✓
- d. Sorting

Your answer is correct.

The correct answer is: Search

Question 8

Correct

Mark 1.00 out
of 1.00

The flowchart symbol used to denote data is

Select one:

- a.
- b.
- c. ✓
- d.

Your answer is correct.



The correct answer is:

Question 9

Correct

Mark 1.00 out
of 1.00

The operation of arranging a list of integers in the order of increasing value is

Select one:

- a. Searching
- b. None of the Above
- c. Traversal
- d. Sorting ✓

Your answer is correct.

The correct answer is: Sorting



Question 10

Correct

Mark 1.00 out
of 1.00

Studying Algorithms and Data Structures helps to (Select all that applies)

Select one or more:

- a. Solve problems in best way ✓
- b. Improve currently existing solution ✓
- c. Run a computer program
- d. Understand and solve problems ✓

Your answer is correct.

The correct answers are: Understand and solve problems, Solve problems in best way, Improve currently existing solution

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Started on Saturday, 26 December 2020, 9:20 PM

State Finished

Completed on Saturday, 26 December 2020, 9:30 PM

Time taken 10 mins 6 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

What is the time complexity of the following code?

```
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
    for (j = 2; j <= N; j = j * 2) {
        k = k + N/ 2;
    }
}
```

Select one:

- a. $O(N \log(N))$ ✓
- b. $O(N^N)$
- c. $O(N)$
- d. $O(N \sqrt{N})$

Your answer is correct.

The correct answer is:

$O(N \log(N))$

Question 2

Correct

Mark 1.00 out of 1.00

Select the factors that are considered for analyzing algorithms.

Select one or more:

- a. HDD Space
- b. Amount of memory used ✓
- c. Amount of work done ✓
- d. Amount of Memory available

Your answer is correct.

The correct answers are: Amount of work done, Amount of memory used



**Question 3**

Incorrect

Mark 0.00 out
of 1.00

The worst case complexity of linear search algorithm is

Select one:

- a. $O(n^2)$ ✗
- b. $O(n)$
- c. $O(\log n)$
- d. $O(n \log(n))$

Your answer is incorrect.

The correct answer is: $O(n)$

Question 4

Correct

Mark 1.00 out
of 1.00

The worst case complexity of Bubble sort algorithm is

Select one:

- a. $O(\log(n))$
- b. $O(n^2)$ ✓
- c. $O(n \log(n))$
- d. $O(n)$

Your answer is correct.

The correct answer is: $O(n^2)$

Question 5

Correct

Mark 1.00 out
of 1.00

Let $f(n) = 7n + 8$ and $g(n) = n$, find c (a suitable constant) such that $O(g(n)) = f(n)$ for $n \geq n_0$

Select one:

- a. 8 ✓
- b. There is no such constant
- c. 7

Your answer is correct.

The correct answer is: 8

Question 6

Correct

Mark 1.00 out
of 1.00

Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?

Select one or more:

- a. $\omega(n^3)$
- b. $o(n^3)$
- c. $O(n^4)$ ✓
- d. $\Theta(n^4)$
- e. $\Omega(n^2)$ ✓

Your answer is correct.

The correct answers are: $O(n^4)$, $\Omega(n^2)$



**Question 7**

Correct

Mark 1.00 out
of 1.00

What are the factors that affect the running time of a program?

Select one:

- a. CPU speed
- b. Nature of input data set
- c. Memory
- d. All of the above ✓

Your answer is correct.

The correct answer is: All of the above

Question 8

Correct

Mark 1.00 out
of 1.00

The worst case complexity of Binary search algorithm is

Select one:

- a. $O(n \log(n))$
- b. $O(n^2)$
- c. $O(n)$
- d. $O(\log(n))$ ✓

Your answer is correct.

The correct answer is: $O(\log(n))$

Question 9

Correct

Mark 1.00 out
of 1.00

The Worst case occur in linear search algorithm when

Select one:

- a. Item is somewhere in the middle of the array
- b. Item is the last element in the array
- c. Item is the last element in the array or is not there at all ✓
- d. Item is not in the array at all

Your answer is correct.

The correct answer is: Item is the last element in the array or is not there at all



Question 10

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

Select one:

- a. $O(N \cdot \text{Sqrt}(N))$
- b. $O(N)$
- c. $O(N^2)$ ✓
- d. $O(N \cdot \log(N))$

Your answer is correct.

The correct answer is: $O(N^2)$ **PREVIOUS ACTIVITY**[◀ Upper, Lower &
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State Finished

Completed on Saturday, 9 January 2021, 7:36 PM

Time taken 8 mins 3 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Recursion is a method in which the solution of a problem depends on

Select one:

- a. Smaller instances of different problems
- b. Smaller instances of the same problem ✓
- c. Larger instances of the same problem
- d. Larger instances of different problems

Your answer is correct.

The correct answer is: Smaller instances of the same problem

Question 2

Incorrect

Mark 0.00 out of 1.00

In a little game, a computer is going to randomly select an integer from 1 to 1000. You'll keep guessing numbers until you find the computer's number, and the computer will tell you each time if your guess was too high or too low. How many guesses you need atmost in your worst case scenario given you use an optimal strategy?

Answer: 9



The correct answer is: 10

Question 3

Correct

Mark 1.00 out of 1.00

Iteration and Recursion are the same programming approach

Select one:

- True
- False ✓

In recursion, the function calls itself till the base condition is reached whereas iteration means repetition of process for example in for-loops.

The correct answer is 'False'.

**Question 4**

Correct

Mark 1.00 out
of 1.00Which of the following problems can be solved using [recursion](#)?

Select one:

- a. Factorial of a number
- b. Nth Fibonacci number
- c. Length of a string
- d. All of the mentioned ✓

Your answer is correct.

The correct answer is: All of the mentioned

Question 5

Correct

Mark 1.00 out
of 1.00

Algorithm(s) which use divide and conquer approach

Select one or more:

- a. Insertion Sort
- b. Merge sort ✓
- c. Selection Sort
- d. Binary search ✓

Your answer is correct.

The correct answers are: Binary search, Merge sort

Question 6

Correct

Mark 1.00 out
of 1.00

What is the correct output of the following function for x=25

```
void RecurciveFunction(int x)
{
    if (x == 0)
        return;

    printf("%d", x%2);
    fun(x/2);
}
```

Select one:

- a. 11111
- b. 10011 ✓
- c. 01100
- d. 11011

Your answer is correct.

The correct answer is: 10011



**Question 7**

Correct

Mark 1.00 out
of 1.00

Which of the following recursion functions can be used to calculate factorial of a number.

Select one:

- a. $\text{fact}(n) = n * \text{fact}(1)$
- b. $\text{fact}(n) = n * \text{fact}(n+1)$
- c. $\text{fact}(n) = n * \text{fact}(n)$
- d. $\text{fact}(n) = n * \text{fact}(n-1)$ ✓

Your answer is correct.

The correct answer is: $\text{fact}(n) = n * \text{fact}(n-1)$

Question 8

Correct

Mark 1.00 out
of 1.00

Worst case time complexity of Merge Sort

Select one:

- a. $O(\log(n))$
- b. $O(n \log(n))$ ✓
- c. $O(n^2)$
- d. $O(n)$

Your answer is correct.

The correct answer is: $O(n \log(n))$

Question 9

Correct

Mark 1.00 out
of 1.00

Consider Following Code

```
void my_recursive_function()
{
    my_recursive_function();
}
```

```
int main()
{
    my_recursive_function();
    return 0;
}
```

What will happen when the above snippet is executed?

Select one:

- a. The code will run for some time and stop when the stack overflows ✓
- b. The code will be executed successfully and no output will be generated
- c. The code will show a compile time error
- d. The code will be executed successfully and random output will be generated

Your answer is correct.

The correct answer is: The code will run for some time and stop when the stack overflows



Question 10

Correct

Mark 1.00 out
of 1.00

Following are program functions which use [recursion](#) to find a given string is a palindrome or not.

```
bool isPalindrome(char str[])
{
    int n = strlen(str);
    if (n == 0)
        return true;
    return palindromRec(str, 0, n - 1);
}

bool palindromRec(char str[], int s, int e)
{
    if (s == e)
        return true;

    if (str[s] != str[e])
        return false;

    if ([__Fill this__])
        return palindromRec(str, s + 1, e - 1);

    return true;
}
```

What is the suitable condition for the blank if statement?

Select one:

- a. $s < e$
- b. $s \leq e + 1$
- c. $s \leq e$
- d. $s < e + 1$ ✓

Your answer is correct.

The correct answers are: $s < e + 1$, $s < e$

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Started on Saturday, 23 January 2021, 12:14 AM

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Completed on Saturday, 23 January 2021, 12:27 AM

Time taken 12 mins 19 secs

Marks 12.00/15.00

Grade 8.00 out of 10.00 (80%)

Question 1

Correct

Mark 1.00 out
of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

- True
- False ✓

False.

Case 3 of the master theorem applies:

$f(n) = O(n^{\log_3 3}) = O(n)$ for $f(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.

Question 2

Correct

Mark 1.00 out
of 1.00

What is the number of Recursive Calls are made when computing the sum of the list [3,5,4,8,1]?

Select one:

- a. 5
- b. 3
- c. 4 ✓
- d. 6

Your answer is correct.

The correct answer is: 4

**Question 3**

Correct

Mark 1.00 out
of 1.00

There are n people born between the year 1000 A.D and 2018 A.D, is it possible to sort them by birthdate in $O(n \log(n))$ time.

Select one:

- True ✓
- False

Birthdate can be represented in a number format in a database, then we can use **Merge Sort** to sort them by birthdate.

The correct answer is 'True'.

Question 4

Correct

Mark 1.00 out
of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Solve for constants

Step 3 ✓

Verify by induction

Step 2 ✓

Guess the form of the solution

Step 1 ✓

Your answer is correct.

The correct answer is: Solve for constants → Step 3, Verify by induction → Step 2, Guess the form of the solution → Step 1

Question 5

Correct

Mark 1.00 out
of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

- a. It has a linear time complexity and a linear space complexity.
- b. It has a double linear complexity.
- c. It has a linear time complexity. ✓
- d. It has a double linear time complexity.

Your answer is correct.

The correct answer is: It has a linear time complexity.

Question 6

Incorrect

Mark 0.00 out
of 1.00

What is/are the best data structure(s) to implement recursive function calls?

Select one or more:

- a. Array ✗
- b. Binary Tree ✗
- c. Stack
- d. Linked List ✗

Your answer is incorrect.

The correct answer is: Stack



**Question 7**

Correct

Mark 1.00 out
of 1.00

Given a set of integers, the number of comparisons necessary to find the maximum element is $n-1$ and the number of comparisons necessary to find the minimum element is $n-1$. Therefore the number of comparisons necessary to simultaneously find the smallest and the largest elements is $2n - 2$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 8

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for run time $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 3T(n/4) + n\log n$$

Select one:

- a. $T(n) = n\log(n)$ ✓
- b. $T(n) = \Theta(n)$
- c. $T(n) = \Theta(n^2)$
- d. Master Theorem does not apply.

Your answer is correct.

The correct answer is: $T(n) = n\log(n)$

Question 9

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 3T(n/5) + \lg^2(n)$$

Select one:

- a. $T(n) = \Theta(n^{\log_3(5)})$
- b. $T(n) = \Theta(\log_2(n))$
- c. $T(n) = \Theta(\lg^2(n))$
- d. $T(n) = \Theta(n^{\log_5(3)})$

✓

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{\log_5(3)})$



Question 10

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 4T(n/2) + n^2\sqrt{n}$$



Select one:

- a. $T(n) = \Theta(n^2)$
- b. $T(n) = \Theta(n)$
- c. $T(n) = \Theta(n \log(n))$
- d. $T(n) = \Theta(n^{2.5})$ ✓

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{2.5})$ **Question 11**

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for run time $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 4T(n/2) + cn$$

Select one:

- a. $T(n) = \Theta(n)$
- b. $T(n) = \Theta(n^2)$ ✓
- c. $T(n) = n \log(n)$
- d. Master Theorem does not apply.

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2)$ **Question 12**

Incorrect

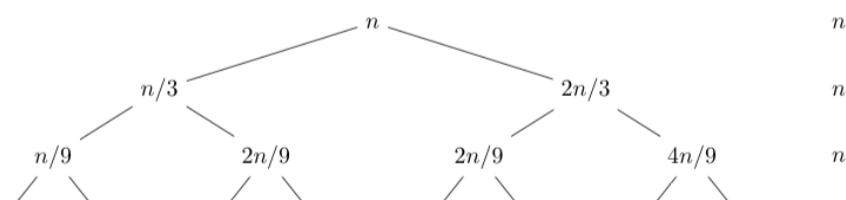
Mark 0.00 out
of 1.00

Recursion Tree is one way to analyze recursive functions.

Consider a function with following time complexity.

$$T(n) = T(n/3) + T(2n/3) + n$$

Following figure shows the first 3 levels of the recursion tree.



What is/are the number(s) which can not appear in the next (4th) level in this recursion tree?

Select one or more:

- a. $n/27$ ✗
- b. $16n/27$
- c. $2n/27$ ✗
- d. $8n/27$ ✗

Your answer is incorrect.

The correct answer is: $16n/27$ 

Question 13

Correct

Mark 1.00 out
of 1.00

Find the solution to following recurrence equation:

$$f(n) = \begin{cases} 1 & \text{if } n=1 \\ 1+f(\lfloor n/2 \rfloor) & \text{if } n \geq 2 \end{cases}$$

Select one:

- a. $f(n) = \log(n)$
- b. $f(n) = \lfloor \log(n) \rfloor + 1$
- c. $f(n) = \lfloor \log(n+1) \rfloor$
- d. $\lfloor f(n) = n \log(n) \rfloor$

The correct answer is: $\lfloor f(n) = \lfloor \log(n) \rfloor + 1 \rfloor$

Question 14

Incorrect

Mark 0.00 out
of 1.00

Consider the following sorting algorithm.

NEW-SORT (A, i, j)

```

if A[i] > A[j]
    then exchange A[i] ↔ A[j]
    if i+1 ≥ j
        then return
    k ← ⌊(j - i + 1)/ 3⌋      /* Round down */
    NEW-SORT (A, i, j-k)       /* First two-thirds */
    NEW-SORT (A, i+k, j)       /* Last two-thirds */
    NEW-SORT (A, i, j-k)       /* First two-thirds again */

```

Recurrence for the worst-case running time of NEW-SORT can be given in genereric form :

$$T(n) = a T(n/b) + f(n)$$

The value of a,b and f(n) are

Select one:

- a. a=3, b=3/2, f(n)=O(1)
- b. a=3, b=2/3, f(n)=O(1)
- c. a=3, b=2/3, f(n)=O(n)
- d. a=3, b=3/2, f(n)=O(n) ✗
- e. none of the above

Your answer is incorrect.

The correct answer is: a=3, b=3/2, f(n)=O(1)



Question 15

Correct

Mark 1.00 out
of 1.00

Solve the following Recursive Algorithm:

$$\begin{aligned} T(n) = & \frac{2T(\frac{n}{2}) + \text{prime}(n)}{\text{if } n > 1 \text{ else } n=1} \end{aligned}$$

Select one:

- a. $T(n) = O(n^2)$
- b. $T(n) = O(n)$
- c. $T(n) = O(n \log(n))$
- d. $T(n) = O(\log(n))$



Your answer is correct.

The correct answer is: $T(n) = O(n \log(n))$

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Started on Thursday, 28 January 2021, 7:26 PM

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Completed on Thursday, 28 January 2021, 7:40 PM

Time taken 13 mins 55 secs

Marks 12.00/12.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Which of the following statement is wrong regarding Python lists and arrays.

Select one:

- a. Both can be indexed and iterated through
- b. Both can be sliced
- c. A Python array with numbers can be divided by a certain number while doing same on python list will result in Type error.
- d. All statements are correct ✓

Your answer is correct.

The correct answer is: All statements are correct

Question 2

Correct

Mark 1.00 out of 1.00

Choose the key advantage of a circular queue:

Select one:

- a. Fast access
- b. Effective usage of memory ✓
- c. Effective usage of processor
- d. None of the mentioned

The correct answer is: Effective usage of memory

**Question 3**

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding implementing data structures

Select one or more:

- a. A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time ✓
- b. A stack can be implemented using two queues. ✓
- c. A queue can be implemented using two stacks. ✓
- d. A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time ✓

Your answer is correct.

The correct answers are: A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time, A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time, A queue can be implemented using two stacks., A stack can be implemented using two queues.

Question 4

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding arrays and list

Select one or more:

- a. Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array. ✓
- b. One advantage of the array compared to list is the ability to perform random access without additional data structures. ✓
- c. In a List, elements are spread about in memory, but linked together. ✓
- d. Insertion is easier in the array compared to list.

Your answer is correct.

The correct answers are: Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array., One advantage of the array compared to list is the ability to perform random access without additional data structures., In a List, elements are spread about in memory, but linked together.

Question 5

Correct

Mark 1.00 out
of 1.00

Which one of the following is not a property of an ADT

Select one:

- a. Has a data specification
- b. Has set of operations
- c. Implementation dependent ✓
- d. Implementation independent

The correct answer is: Implementation dependent



Question 6

Correct

Mark 1.00 out
of 1.00

Consider the following operation performed on a stack of size 5.

```
Push(1);  
Pop();  
Push(2);  
Push(3);  
Pop();  
Push(4);  
Pop();  
Pop();  
Push(5);
```

After the completion of all operation, the number of elements present in stack are

Select one:

- a. 3
- b. 2
- c. 1 ✓ Number of elements present in stack is equal to the difference between number of push operations and number of pop operations. Number of elements is $5-4=1$.
- d. 4

Your answer is correct.

The correct answer is: 1

Question 7

Correct

Mark 1.00 out
of 1.00

Which of the following statement(s) is/are correct regarding dictionary data structure.

Select one or more:

- a. Dictionaries are often implemented as hash tables. ✓
- b. A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value. ✓
- c. In a dictionary, if the value of a key is null, then search operation on that dictionary will return that key as non-existent.
- d. Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements. ✓

Your answer is correct.

The correct answers are: A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value., Dictionaries are often implemented as hash tables., Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements.



**Question 8**

Correct

Mark 1.00 out
of 1.00

Choose the correct statement about an array

Select one:

- a. Number of elements in an array can be increased ✓
- b. Array is not a data structure
- c. Arrays cannot grow dynamically
- d. You need to always declare the number of elements in an array

The correct answer is: Number of elements in an array can be increased

Question 9

Correct

Mark 1.00 out
of 1.00

Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

Select one:

- a. Searching of an unsorted list for a given item
- b. Deleting a node whose location is given ✓
- c. Traversing a list to process each node
- d. Inverting a node after the node with given location

Your answer is correct.

The correct answer is: Deleting a node whose location is given

Question 10

Correct

Mark 1.00 out
of 1.00Choose the output of the following code segment on python list :


```
A=[1,2,3,4,5,6,7,8,9]  
A[::2]=10,20,30,40,50,60  
Print(A)
```

Select one:

- a. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓
- b. [1, 2, 10, 20, 30, 40, 50, 60]
- c. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
- d. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5

Question 11

Correct

Mark 1.00 out
of 1.00

What does 'stack overflow' mean by :

Select one:

- a. Deleting an item from an empty stack
- b. Inserting a large amount of data that is larger than the available memory
- c. Accessing an undefined item from stack
- d. Inserting new items to a full stack ✓

The correct answer is: Inserting new items to a full stack

Question 12

Correct

Mark 1.00 out
of 1.00

Which one of the following is a queue

Select one:

- a. Array
- b. Multi dimentional array
- c. LIFO list
- d. FIFO list ✓

The correct answer is: FIFO list

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Completed on Monday, 15 February 2021, 5:13 PM

Time taken 9 mins 39 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Suppose that we have numbers between 1 and 1000 in a binary search tree, and we want to search for the number 363. Which of the following sequences could not be the sequence of nodes examined?

Select one:

- a. 2, 252, 401, 398, 330, 344, 397, 363
- b. 925, 202, 911, 240, 912, 245, 363 ✓
- c. 924, 220, 911, 244, 898, 258, 362, 363
- d. 2, 399, 387, 219, 266, 382, 381, 278, 363

Your answer is correct.

The correct answer is: 925, 202, 911, 240, 912, 245, 363

Question 2

Correct

Mark 1.00 out of 1.00

In a pre-order traversal of a binary search tree, the first item printed out is always the smallest one.

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 3

Correct

Mark 1.00 out of 1.00

By which Factor does the Binary Search Narrows the Search?

Select one:

- a. Two (2) times at each search operation
- b. Two (2) times at each iteration ✓
- c. Does not narrow the search by any factor
- d. Four (4) times at each iteration

The correct answer is: Two (2) times at each iteration



**Question 4**

Correct

Mark 1.00 out
of 1.00**Select correct statement about K-ary Tree****Select one or more:**

- a. K-ary tree can have K^d nodes in the depth of d ✓
- b. K-ary is special type of binary tree.
- c. In K-ary tree all internal nodes have exactly K children
- d. In K-ary tree children node values are always lower than the parent.

Your answer is correct.**The correct answer is: K-ary tree can have K^d nodes in the depth of d****Question 5**

Correct

Mark 1.00 out
of 1.00**What is the running time of Linear Search when all the elements in a list are sorted?****n - Number of Elements in List****Select one:**

- a. $O(n)$ ✓
- b. $O(n^2)$
- c. $O(n \log(n))$
- d. $O(\log(n))$

The correct answer is: $O(n)$ **Question 6**

Correct

Mark 1.00 out
of 1.00**Select whether the following statement is True/False.***Binary Search is appropriate for linked lists***Select one:**

- a. True
- b. False ✓

The correct answer is 'False'.**Question 7**

Correct

Mark 1.00 out
of 1.00**What is the branching factor of Binary Search Tree?****Select one:**

- a. 2 ✓
- b. 1
- c. 4
- d. 3

The correct answer is: 2

**Question 8**

Correct

Mark 1.00 out
of 1.00

What is the number of nodes at depth d in a k-ary Tree?

Select one:

- a. d^k
- b. $d!$
- c. k^d
- d. $\lfloor (kd) \rfloor$

The correct answer is: $\lfloor (kd) \rfloor$ **Question 9**

Correct

Mark 1.00 out
of 1.00

What is the number of internal nodes of a complete k-ary tree?

Select one:

- a. $\lfloor ((h^k - 1)/(h-1)) \rfloor$
- b. $\lfloor ((k^{h-1})/(k-1)) \rfloor$
- c. $\lfloor (k^{\{h-1\}}) \rfloor$
- d. $\lfloor ((k^{h-1})/k) \rfloor$

Your answer is correct.

The correct answer is: $\lfloor ((k^{h-1})/(k-1)) \rfloor$ **Question 10**

Correct

Mark 1.00 out
of 1.00

Consider numbers 3, 9, 1, 17, 14, 22, 20. These numbers are inserted in to a balanced binary tree, Which tree traversal method would output the following sequence.

14, 3, 1, 9, 20, 17, 22

Select one:

- a. Preorder ✓
- b. Non of the above
- c. Postorder
- d. Inorder

The correct answer is: Preorder



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Started on Saturday, 20 February 2021, 10:35 AM
State Finished
Completed on Saturday, 20 February 2021, 10:46 AM
Time taken 11 mins 47 secs
Grade 10.00 out of 10.00 (100%)

Question 1
Correct
Mark 1.00 out of 1.00

Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28

How many heapify operations have been performed on root of heap?

Select one:

a. 1
 b. 2 ✓
 c. 3 or 4
 d. 5 or 6

Your answer is correct.
The correct answer is: 2

Question 2
Correct
Mark 1.00 out of 1.00

What is the worst-time complexity of HeapMaximum operation?

Select one:

a. $O(n^2)$
 b. $O(n)$
 c. $O(\log(n))$ ✓
 d. $O(n \log(n))$

The correct answer is: $O(\log(n))$

Question 3
Correct
Mark 1.00 out of 1.00

Does heap exhibit the properties of a binary tree?

Select one:

True ✓
 False

The correct answer is 'True'.

**Question 4**

Correct

Mark 1.00 out
of 1.00

What is the typical running time of a heap sort algorithm?

Select one:

- a. $O(N)$
- b. $O(\log N)$
- c. $O(N \log N)$ ✓ The total running time of a heap sort algorithm is mathematically found to be $O(N \log N)$.
- d. $O(N^2)$

Your answer is correct.

The correct answer is: $O(N \log N)$ **Question 5**

Correct

Mark 1.00 out
of 1.00Consider a binary min heap containing n elements and every node is having degree 2 (i.e. full binary min heap tree). What is the probability of finding the largest element at the last level ?

Select one:

- a. $1/2$
- b. $1/n$
- c. $1/2^n$
- d. 1 ✓

Your answer is correct.

The correct answer is: 1

Question 6

Correct

Mark 1.00 out
of 1.00Which of the following is not a standard in-place sorting algorithm?

Select one:

- a. Selection sort
- b. Heap sort
- c. Quick sort
- d. Merge sort ✓

The correct answer is: Merge sort



Question 7

Correct

Mark 1.00 out
of 1.00

What is the time complexity of following algorithm which is created to return the smallest index i at which $x \leq a[i]$ for a given array?

```
func Search(a []int, x int) int {
    switch len(a) {
    case 0:
        return 0
    case 1:
        if x <= a[0] {
            return 0
        }
        return 1
    }
    mid := 1 + (len(a)-1)/2
    if x <= a[mid-1] {
        return Find(a[:mid], x)
    }
    return mid + Find(a[mid:], x)
}
```

Select one:

- a. $O(n)$
- b. $O(n \log n)$
- c. $O(n^2)$
- d. $O(\log n)$ ✓

Your answer is correct.

we simplify the problem by only computing the asymptotic time complexity, and let all constants be 1. Then the recurrences become

- $T(1) = 1$, (*)
- $T(n) = 1 + T(n/2)$, when $n > 1$.

it's possible to find a solution by repeated substitution.

$$\begin{aligned} T(n) &= (**) \\ 1 + T(n/2) &= (**) \\ 1 + (1 + T(n/4)) &= 2 + T(n/4) = (**) \\ 2 + (1 + T(n/8)) &= 3 + T(n/8) = \dots \\ k + T(n/2^k) &= \dots \\ \log n + T(n/2^{\log n}) &= \log n + T(1) = (*) \\ \log n + 1 &= \Theta(\log n). \end{aligned}$$
The correct answer is: $O(\log n)$ **Question 8**

Correct

Mark 1.00 out
of 1.00

State True/False:

For any Heap represented as an array (A),
 $A.\text{heapsSize} \leq A.length$

Select one:

- True ✓
- False

The correct answer is 'True'.



**Question 9**

Correct

Mark 1.00 out
of 1.00

Which of the following is the recurrence relation for Heapify Operation?

Select one:

- a. $T(n) \leq T(3n/2) + \Theta(1)$
- b. $T(n) \leq T(n/2) + \Theta(1)$
- c. $T(n) \leq T(2n/3) + \Theta(1)$
- d. $T(n) \leq T(2n/3) + \Theta(n)$



The correct answer is: $T(n) \leq T(2n/3) + \Theta(1)$

Question 10

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of BUILDHEAP operation?

Select one:

- a. $O(\log(n))$
- b. $O(n)$
- c. $O(n^2)$
- d. $O(n \log(n))$

The correct answer is: $O(n)$

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◀ Lecture Slides: Heap Data Structure & Heapsort

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Zeetings : L7 Heap Data Structure & Heap sort ►

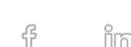
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Started on Saturday, 6 March 2021, 8:51 AM

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Completed on Saturday, 6 March 2021, 9:06 AM

Time taken 15 mins 16 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Using the collision resolution strategy of Linear Probing, fill in the missing elements in the Hash Table, where $H(k) = k \% M$ and $M = 5$, after executing all the operations shown below.

Insert: 5

Insert: 10

Insert: 11

Insert: 12

Insert: 13

0	1	2	3	4
?	?	?	?	?

Write your answer as comma separated values with no spaces.

Eg - 5,11,10,12,13

Answer: 5,10,11,12,13



The correct answer is: 5,10,11,12,13

Question 2

Correct

Mark 1.00 out of 1.00

Hash table is?

Select one:

- a. A structure used to implement stack and queue
- b. A structure that maps keys to values ✓
- c. A structure used for storage
- d. A structure that maps values to keys

The correct answer is: A structure that maps keys to values



Question 3

Correct

Mark 1.00 out
of 1.00

The time complexity of all operations associated with Direct Address table are not $O(1)$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 4

Correct

Mark 1.00 out
of 1.00

A hash function is

Select one:

- a. A function with allocated memory to keys
- b. None of the mentioned
- c. A function that computes the location of the key in the array ✓
- d. A function that creates an array

The correct answer is: A function that computes the location of the key in the array

Question 5

Correct

Mark 1.00 out
of 1.00

Suppose you have a Hash Table that has 500 slots. It currently holds 99 keys, all in different locations in the Hash Table (i.e., there are no collisions thus far). What is the probability that the next key you insert will cause a collision? **Input your answer in decimal form and round to the nearest 3 digits.**

Answer: 0.198



The correct answer is: 0.198

Question 6

Correct

Mark 1.00 out
of 1.00

Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, select the resulting tables after inserting the values in the given order with chaining

Select one:

- a. 0 [3920] 1 [430] 2 [22] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- b. 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]
- c. 0 [430] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- d. 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234] ✓

The correct answer is: 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234]



Question 7

Correct

Mark 1.00 out
of 1.00

The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?



Select one:

0	
1	
2	12, 2
3	13, 3, 23
4	
5	5, 15
6	
7	
8	18
9	

 a.

0	
1	
2	2
3	23
4	
5	15
6	
7	
8	18
9	

 b.

0	
1	
2	12
3	13
4	
5	5
6	
7	
8	18
9	

 c.

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

 d. ✓

Your answer is correct.





0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

The correct answer is:

Question 8

Correct

Mark 1.00 out
of 1.00

Consider a hash table with 50 slots which use chaining as a collision avoidance mechanism. And assume simple uniform hashing. What is the probability that the first 3 slots are unfilled after the first 3 insertions?

Hint - Check Uniform Hashing

Select one:

a. $\frac{49 \times 49 \times 49}{50 \times 50 \times 50}$

b. $\frac{47 \times 47 \times 47}{3! \times 50}$

c. $\frac{49 \times 48 \times 47}{50 \times 50 \times 50}$

d. $\frac{47 \times 47 \times 47}{50 \times 50 \times 50}$



The correct answer is: $\frac{47 \times 47 \times 47}{50 \times 50 \times 50}$

Question 9

Correct

Mark 1.00 out
of 1.00

Using division method, in a given hash table of size 157, the key of value 172 be placed at position

Select one:

a. 15 ✓

b. 19

c. 72

d. 17

Your answer is correct.

The correct answer is: 15



Question 10

Correct

Mark 1.00 out
of 1.00

Which one of the following hash functions on integers will distribute keys most uniformly over 10 buckets numbered 0 to 9 for i ranging from 0 to 20?

Select one:

- a. $h(i) = (11 * i^2) \bmod 10$
- b. $h(i) = (12 * i) \bmod 10$
- c. $h(i) = i^2 \bmod 10$
- d. $h(i) = i^3 \bmod 10$ ✓

The correct answer is: $h(i) = i^3 \bmod 10$

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Started on Wednesday, 24 March 2021, 11:20 AM

State Finished

Completed on Wednesday, 24 March 2021, 11:32 AM

Time taken 12 mins 10 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

For a Graph $G = (V, E)$ and source vertex s , Breadth First Search(BFS) algorithm builds breadth-first tree with root s that contains all reachable vertices.

Select one:

True ✓

False

The correct answer is 'True'.

Question 2

Correct

Mark 1.00 out of 1.00

Select one:

a. $O(V / E)$

b. $O(V + E)$ ✓

c. $O(\log(V + E))$

d. $O(V * E)$

Your answer is correct.

The correct answer is: $O(V + E)$

Question 3

Correct

Mark 1.00 out of 1.00

Which of the following data structure is used to implement DFS?

Select one:

a. Tree

b. Stack ✓

c. Queue

d. Linked list

Your answer is correct.

The correct answer is: Stack

**Question 4**

Correct

Mark 1.00 out
of 1.00

Breadth First Search is equivalent to which of the traversal in the Binary Trees?

Select one:

- a. Pre-order Traversal
- b. Post-order Traversal
- c. In-order Traversal
- d. None of the above ✓

Your answer is correct.

The correct answer is: None of the above

Question 5

Correct

Mark 1.00 out
of 1.00

The Data structure used in standard implementation of Breadth First Search is?

Select one:

- a. Stack
- b. Linked List
- c. Tree
- d. Queue ✓

Your answer is correct.

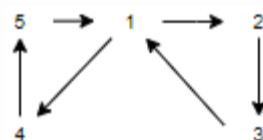
The correct answer is: Queue

Question 6

Correct

Mark 1.00 out
of 1.00

Which of the following is a possible result of depth first traversal of the given graph(consider 1 to be source element)?



Select one:

- a. 1 2 3 1 4 5
- b. 1 4 5 1 2 3
- c. 1 4 5 3 2
- d. 1 2 3 4 5 ✓

Your answer is correct.

<https://www.sanfoundry.com/data-structure-questions-answers-non-recursive-depth-first-search/>

As 1 is the source element so it will be considered first. Then we start exploring the vertices which are connected to 1. So there will be two possible results-1 2 3 4 5 and 1 4 5 2 3.

The correct answer is: 1 2 3 4 5



Question 7

Incorrect

Mark 0.00 out
of 1.00

Which of the following represent the correct pseudo code for non recursive DFS algorithm?

Select one:

a.

```
procedure DFS-non_recursive(G,v):
    //let St be a stack
    St.pop()
    while St is not empty
        v = St.push(v)
        if v is not discovered:
            label v as discovered
            for all adjacent vertices of v do
                St.push(a) //a being the adjacent vertex
```

b.

```
procedure DFS-non_recursive(G,v):
    //let St be a stack
    St.push(v)
    while St is not empty
        v = St.pop()
        if v is not discovered:
            label v as discovered
            for all adjacent vertices of v do
                St.push(v)
```

c.

```
procedure DFS-non_recursive(G,v):
    //let St be a stack
    St.pop(v)
    while St is not empty
        v = St.pop()
        if v is not discovered:
            label v as discovered
            for all adjacent vertices of v do
                St.push(a) //a being the adjacent vertex
```

d.

```
procedure DFS-non_recursive(G,v):
    //let St be a stack
    St.push(v)
    while St is not empty
        v = St.pop()
        if v is not discovered:
            label v as discovered
            for all adjacent vertices of v do
                St.push(a) //a being the adjacent vertex
```

Your answer is incorrect.

The correct answer is:

```
procedure DFS-non_recursive(G,v):
    //let St be a stack
    St.push(v)
    while St is not empty
        v = St.pop()
        if v is not discovered:
            label v as discovered
            for all adjacent vertices of v do
                St.push(a) //a being the adjacent vertex
```



Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following is/are the application(s) of Depth First Search

Select one or more:

- a. Finding all neighbor nodes in Peer to Peer Networks like BitTorrent.
- b. Detecting the existence of cycles in a graph. ✓
- c. To find friends and friends of friend of a person in social networks like Facebook
- d. Solving puzzles with only one solution like mazes ✓

Your answer is correct.

The correct answers are: Solving puzzles with only one solution like mazes, Detecting the existence of cycles in a graph.



Question 9

Correct

Mark 1.00 out
of 1.00

Pseudo codes for Breadth First Search(BFS) and Depth First Search(DFS) which look alike except one line is given below. Select the correct pseudo code segments for STATEMENT 1 and STATEMENT 2.

BFS(G)

```
{  
list L = empty  
tree T = empty  
choose a starting vertex x  
search(x)  
while(L nonempty)  
    STATEMENT 1  
    if w not yet visited  
    {  
        add (v,w) to T  
        search(w)  
    }  
}  
  
DFS(G)  
{  
list L = empty  
tree T = empty  
choose a starting vertex x  
search(x)  
while(L nonempty)  
    STATEMENT 2  
    if w not yet visited  
    {  
        add (v,w) to T  
        search(w)  
    }  
}  
  
search(vertex v)  
{  
visit(v);  
for each edge (v,w)  
    add edge (v,w) to end of L  
}
```

STATEMENT 2

remove edge (v,w) from end of L

**STATEMENT 1**

remove edge (v,w) from start of L



Your answer is correct.

<https://www.ics.uci.edu/~eppstein/161/960215.html>

Both of these search algorithms keep a list of edges to explore; the only difference between the two is that, while both algorithms adds items to the end of L, BFS removes them from the beginning, which results in maintaining the list as a queue, while DFS removes them from the end, maintaining the list as a stack.

The correct answer is: STATEMENT 2 → remove edge (v,w) from end of L, STATEMENT 1 → remove edge (v,w) from start of L



Question 10

Correct

Mark 1.00 out
of 1.00

Regarding implementation of Breadth First Search using queues, at a given time, what is the maximum difference between depth of any two nodes present in the queue?

Select one:

- a. Can be anything
- b. Atmost 1 ✓
- c. 0
- d. Insufficient Information

Your answer is correct.

The correct answer is: Atmost 1

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Started on Saturday, 27 March 2021, 9:44 PM

State Finished

Completed on Saturday, 27 March 2021, 9:52 PM

Time taken 7 mins 10 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Select the two basic properties of Spanning Tree.

Select one or more:

- a. Not Connected
- b. Cyclic
- c. Acyclic ✓
- d. Connected ✓

The correct answers are: Connected, Acyclic

Question 2

Correct

Mark 1.00 out
of 1.00

Consider a minimum spanning tree (T) obtained from an undirected graph. Can you use the tree to visit each vertex in the graph from a given origin?

Select one:

- True ✓
- False

The correct answer is 'True'.

Question 3

Correct

Mark 1.00 out
of 1.00

Is the following statement True/False?

Steiner Minimum Trees (SMT) are **not** similar to Minimum Spanning Tree (MST) under any circumstance.

Select one:

- True
- False ✓

The correct answer is 'False'.



**Question 4**

Correct

Mark 1.00 out
of 1.00

State True/False.

MST for a given graph is unique.

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 5

Correct

Mark 1.00 out
of 1.00Consider a complete undirected graph with vertex set $\{0, 1, 2, 3, 4\}$. W_{ij} entry in the matrix W below is the weight of the edge $\{i, j\}$.In the graph given, what is the minimum possible weight of a path P from vertex 1 to vertex 2 in this graph such that P contains at most 3 edges?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 7
- b. 9
- c. 10
- d. 8 ✓

The correct answer is: 8

Question 6

Correct

Mark 1.00 out
of 1.00Consider a complete undirected graph with vertex set $\{0, 1, 2, 3, 4\}$. W_{ij} entry in the matrix W below is the weight of the edge $\{i, j\}$. What is the minimum possible weight of a spanning tree T in this graph such that vertex 0 is a leaf node in the tree T ?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 10 ✓
- b. 9
- c. 7
- d. 8

The correct answer is: 10



Question 7

Correct

Mark 1.00 out
of 1.00

Consider a weighted complete graph G on the vertex set V_1, V_2, \dots, V_n such that the weight of the edge (V_i, V_j) is $2|i - j|$. The weight of a minimum spanning tree of G is:

Select one:

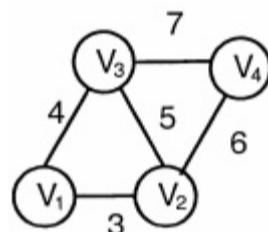
- a. $2n - 2$ ✓
- b. ${}^n C_2$
- c. n^2
- d. $n - 1$

The correct answer is: $2n - 2$ **Question 8**

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What is the length of the path from V_5 to V_6 in the MST of the above graph with $n = 10$?

Select one:

- a. 41
- b. 31 ✓
- c. 25
- d. 11

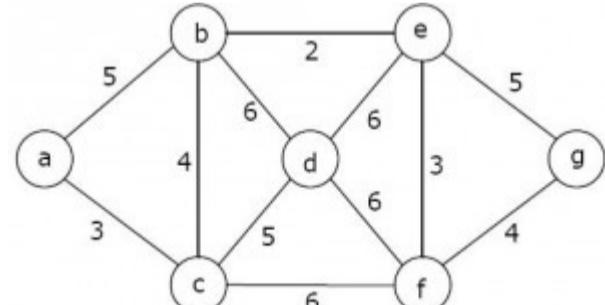
The correct answer is: 31

Question 9

Correct

Mark 1.00 out
of 1.00

Which one of the following is NOT the sequence of edges added to the minimum spanning tree of the graph in the figure using Kruskal's algorithm?



Select one:

- a. (b,e)(e,f)(a,c)(b,c)(f,g)(c,d)
- b. (b,e)(a,c)(e,f)(b,c)(f,g)(c,d)
- c. (b,e)(e,f)(b,c)(a,c)(f,g)(c,d) ✓
- d. (b,e)(e,f)(a,c)(f,g)(b,c)(c,d)

The correct answer is: (b,e)(e,f)(b,c)(a,c)(f,g)(c,d)

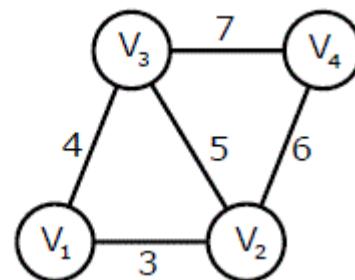


Question 10

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What will be the cost of the minimum spanning tree (MST) of such a graph with n nodes?

Select one:

- a. $2n + 1$
- b. $\frac{1}{12}(11n^2 - 5n)$
- c. $n^2 - n + 1$
- d. $6n - 11$



The correct answer is: $\backslash(n^2-n+1\backslash)$

PREVIOUS ACTIVITY

◀ Lecture Slides:
Minimum Spanning
Trees

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NEXT ACTIVITY

Lecture Slides: Single-
Source Shortest Path ►

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State Finished

Completed on Wednesday, 7 April 2021, 9:36 PM

Time taken 8 mins 33 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Which strategy does Djikstra's Algorithm follow?

Select one:

- a. Greedy ✓
- b. Exhaustive Search
- c. Binary Search
- d. Dynamic Programming

The correct answer is: Greedy

Question 2

Correct

Mark 1.00 out
of 1.00

What is the worst case space complexity of Bellman Ford algorithm?

Select one:

- a. $O(|E| |V|)$
- b. $O(|V|)$ ✓
- c. $O(|V|^2)$
- d. $O(|E|)$

The correct answer is: $O(|V|)$

Question 3

Correct

Mark 1.00 out
of 1.00

What is the time complexity of Dijkstra's shortest path algorithm?

Select one:

- a. $O(|E| |V|)$
- b. $O(|V|^2)$
- c. $O(|V|)$
- d. $O(|E| \log |V|)$ ✓

Your answer is correct.

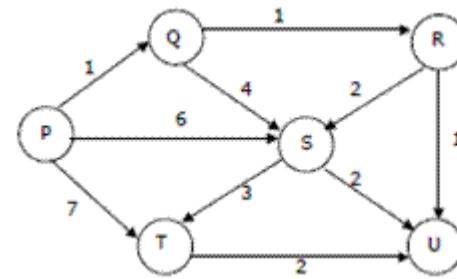
The correct answers are: $O(|E| \log |V|)$, $O(|V|^2)$

Question 4

Correct

Mark 1.00 out
of 1.00

Suppose we run Dijkstra's single source shortest-path algorithm on the following edge weighted directed graph with vertex P as the source. In what order do the nodes get included into the set of vertices for which the shortest path distances are finalized?



Select one:

- a. P, Q, R, U, S, T ✓
- b. P, Q, R, U, T, S
- c. P, Q, R, S, T, U
- d. P, Q, T, R, U, S

The correct answer is: P, Q, R, U, S, T

Question 5

Correct

Mark 1.00 out
of 1.00

Consider a weighted directed graph $G = (V, E, w)$ and let X be a shortest $s-t$ path for $s, t \in V$. If we double the weight of every edge in the graph, setting $w'(e) = 2w(e)$ for each $e \in E$, then X will still be a shortest $s - t$ path in (V, E, w') .

Select one:

- True ✓
- False

Any linear transformation of all weights maintains all relative path lengths, and thus shortest paths will continue to be shortest paths, and more generally all paths will have the same relative ordering. One simple way of thinking about this is unit conversions between kilometers and miles.

The correct answer is 'True'.



Question 6

Correct

Mark 1.00 out
of 1.00

Select the correct pseudo code to compute the shortest path in Dijkstra's algorithm?

Select one:

 a.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase (T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

 b.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase(T[w].Dist to T[v].Dist);
        T[w].path=v; }
```

 c.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) > T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

 d.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```



Your answer is correct.

The correct answer is:

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

Question 7

Correct

Mark 1.00 out
of 1.00

Dijkstra's algorithm may not terminate if the graph contains negative-weight edges.

Select one:

 True False

It always terminates after $|E|$ relaxations and $|V| + |E|$ priority queue operations, but may produce incorrect results.

The correct answer is 'False'.



Question 8

Correct

Mark 1.00 out
of 1.00

Given a graph $G = (V,E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.

Select one:

- True ✓
 False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.

The correct answer is 'True'.

Question 9

Correct

Mark 1.00 out
of 1.00

Consider a weighted, directed acyclic graph $G= (V,E,w)$ in which edges that leave the source vertex s may have negative weights and all other edge weights are non-negative. Does Dijkstra's algorithm correctly compute the shortest-path weight $\delta(s,t)$ from s to every vertex t in this graph?

Select one:

- True ✓
 False

For the correctness of Dijkstra, it is sufficient to show that $d[v] = \delta(s,v)$ for every $v \in V$ when v is added to S . Given the shortest $s; v$ path and given that vertex u precedes v on that path, we need to verify that u is in S . If $u = s$, then certainly u is in S . For all other vertices, we have defined v to be the vertex not in S that is closest to s . Since $d[v] = d[u] + w(u,v)$ and $w(u,v) > 0$ for all edges except possibly those leaving the source, u must be in S since it is closer to s than v .

The correct answer is 'True'.

Question 10

Correct

Mark 1.00 out
of 1.00

A graph can have a negative weight cycle when?

Select one:

- a. The graph has 1 negative weighted edge
 b. The total weight of the graph is negative ✓
 c. The graph has a cycle
 d. The graph has 1 or more negative weighted edges

Your answer is correct.

When the total weight of the graph sums up to a negative number then the graph is said to have a negative weight cycle. Bellmann Ford Algorithm provides no solution for such graphs.

The correct answer is: The total weight of the graph is negative





PREVIOUS ACTIVITY

◀ Lecture Slides:
Single-Source Shortest
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Completed on Thursday, 1 April 2021, 3:41 PM

Time taken 17 mins 16 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Recurrence equations describing the work done during [recursion](#) are only useful for divide and conquer algorithm analysis

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 2

Correct

Mark 1.00 out of 1.00

The difference between Divide and Conquer and Dynamic Programming is:

Select one:

- a. Whether the subproblems overlap or not ✓
- b. The depth of recurrence
- c. The way we solve the base case
- d. The division of problems and combination of subproblems

Your answer is correct.

The correct answer is: Whether the subproblems overlap or not

Question 3

Correct

Mark 1.00 out of 1.00

Dynamic programming does not work if the subproblems:

Select one:

- a. Cannot be divided in half
- b. Share resources and thus are not independent ✓
- c. Have to be divided too many times to fit into memory
- d. Overlap

Your answer is correct.

The correct answer is: Share resources and thus are not independent

**Question 4**

Correct

Mark 1.00 out
of 1.00

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:

(Select the correct attribute)

Select one:

- a. Complexity of the algorithm
- b. Recursion equation
- c. Subproblems ✓
- d. Divide and conquer strategy

Your answer is correct.

The correct answer is: Subproblems

Question 5

Correct

Mark 1.00 out
of 1.00

A divide and conquer approach to solving a problem is useful when

Select one:

- a. The subproblems are overlapping so we don't have to solve them over and over again
- b. The complexity is exponential to solve the entire problem
- c. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓
- d. None of the above

Your answer is correct.

The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size

Question 6

Correct

Mark 1.00 out
of 1.00

Dynamic Programming is often used for (choose all that apply)

Select one or more:

- a. Problems previously solved using divide and conquer that have overlapping subproblems ✓
- b. Subproblems where resources are shared
- c. Non-polynomial solution problems
- d. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓

Your answer is correct.

The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems



Question 7

Correct

Mark 1.00 out
of 1.00

Every recurrence can be solved using the Master Theorem

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 8

Correct

Mark 1.00 out
of 1.00

What are 2 things required in order to successfully use the dynamic programming technique?

Select one:

- a. Divide and conquer
- b. Optimal substructure and overlapping sub-problems ✓
- c. A problem that can't be subdivided and is complex
- d. Non-overlapping subproblems and intervals
- e. Recursion and a problem that is complex

Your answer is correct.

The correct answer is: Optimal substructure and overlapping sub-problems

Question 9

Correct

Mark 1.00 out
of 1.00

Assume we are solving the rod-cutting problem in the book using dynamic programming, and we have a rod of length n that we decide to cut at location

- i. How many subproblems are left after we make this cut
- ii. How many choices do we need to check for each subproblem?

We are trying to find the maximum profit from the rod lengths that we cut.

Select one:

- a. 2 subproblems, n choices we have to check
- b. No subproblems, we just solve the problem directly
- c. 3 subproblems, $n-1$ choices to check
- d. 1 subproblem, up to n choices we have to check ✓

Your answer is correct.

The correct answer is: 1 subproblem, up to n choices we have to check



Question 10

Correct

Mark 1.00 out
of 1.00

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization:

 Dynamic Programming ✓

2. Unweighted shortest simple path in a graph:

 Dynamic Programming ✓

3. Quicksort: Divide and Conquer



4. Longest common subsequence:

 Dynamic Programming ✓

Your answer is correct.

The correct answer is:

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization: [Dynamic Programming]

2. Unweighted shortest simple path in a graph: [Dynamic Programming]

3. Quicksort: [Divide and Conquer]

4. Longest common subsequence: [Dynamic Programming]

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Completed on Saturday, 19 December 2020, 6:23 PM

Time taken 16 mins 18 secs

Grade 9.67 out of 10.00 (97%)

Question 1

Correct

Mark 1.00 out
of 1.00

Which of the following is a computational task?

Select one:

- a. What is $54 * 566$?
- b. Given a whole number A, is A prime? ✓
- c. What is $85 - 9 + 4$?
- d. All of the Above

Your answer is correct.

The correct answer is: Given a whole number A, is A prime?

Question 2

Correct

Mark 1.00 out
of 1.00

Finding the location of the element with a given value is:

Select one:

- a. Sorting
- b. Merging
- c. Search ✓
- d. Inserting

Your answer is correct.

The correct answer is: Search

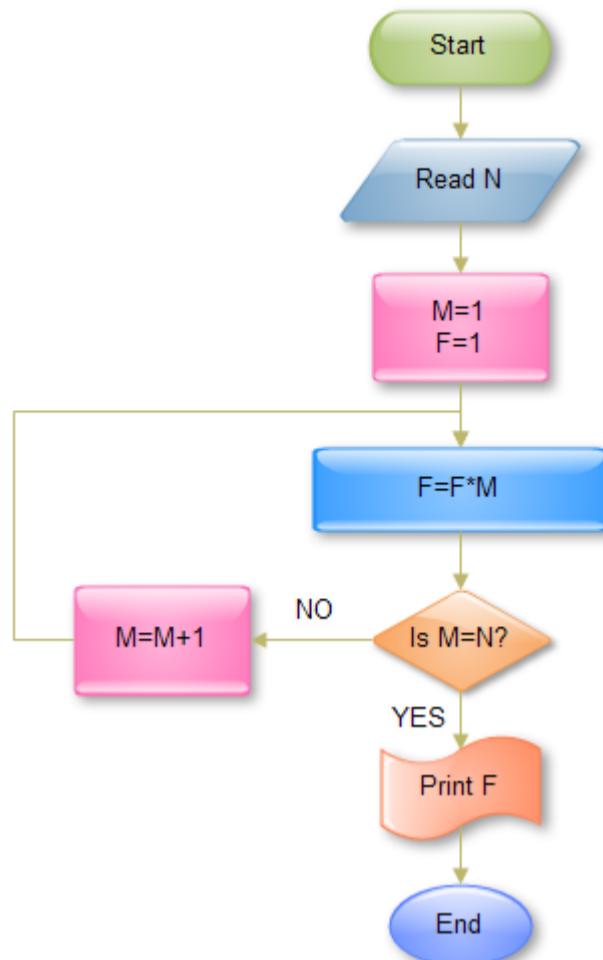


Question 3

Correct

Mark 1.00 out
of 1.00

What is the result (F) when the input (N) = 5?



Select one:

- a. 50
- b. 120 ✓
- c. 100
- d. 150

Your answer is correct.

The correct answer is: 120

Question 4

Correct

Mark 1.00 out
of 1.00

The operation of processing each element in the list is known as

Select one:

- a. Merging
- b. Traversal ✓
- c. Inserting
- d. Sorting

Your answer is correct.

The correct answer is: Traversal

Question 5

Correct

Mark 1.00 out
of 1.00

A flowchart is a diagram that shows the "

flow of control

✓ " of an algorithm/a program.

(Fill the blank using the most appropriate word/ phrase)



Question 6

Partially
correct

Mark 0.67 out
of 1.00

Standard way of specifying an algorithm is/are

Select one or more:

- a. Class Diagram ✗
- b. Flowcharts ✓
- c. Pseudo Code ✓
- d. Specifying Steps ✓

Your answer is partially correct.

You have selected too many options.

The correct answers are: Flowcharts, Pseudo Code, Specifying Steps



Question 7

Correct

Mark 1.00 out
of 1.00

Following pseudocode is used to sort a list using insertion sort.
What is the missing code segment (indicated as <missing>)?

```
INSERTION-SORT(A)
    for j = 2 to A.length
        key = A[j]
        i = j-1
        while i > 0 and A[i] > key
            <missing>
        A[i+1] = key
```

Select one:

a.
A[i-1] = A[i]
i = i+1

b.
A[i+1] = A[i]
i = i-1 ✓

c.
A[i-1] = A[i]
i = i-1

d.
A[i+1] = A[i]
i = i+1

Your answer is correct.

The correct answer is:

A[i+1] = A[i]
i = i-1



Question 8

Correct

Mark 1.00 out
of 1.00

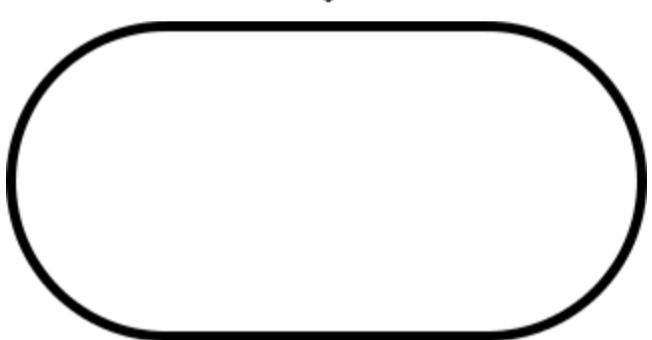
The flowchart symbol used to denote decision is

Select one:

a.



b.



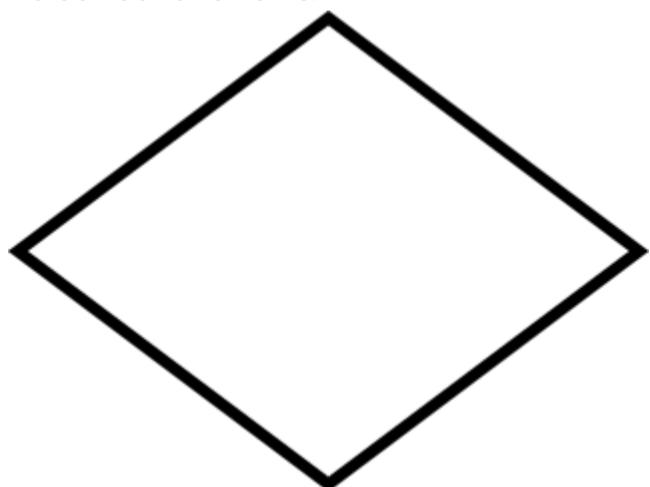
c.



d.

Your answer is correct.

The correct answer is:



Question 9

Correct

Mark 1.00 out
of 1.00

What is an Algorithm?

Select one:

- a. A step by step method of solving a computational task ✓
- b. A step by step method of solving a task
- c. A way to solve a problem
- d. A computer program

Your answer is correct.

The correct answer is: A step by step method of solving a computational task

Question 10

Correct

Mark 1.00 out
of 1.00

Studying Algorithms and Data Structures helps to (Select all that applies)

Select one or more:

- a. Improve currently existing solution ✓
- b. Understand and solve problems ✓
- c. Solve problems in best way ✓
- d. Run a computer program

Your answer is correct.

The correct answers are: Understand and solve problems, Solve problems in best way, Improve currently existing solution

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◀ Flowchart Examples

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Completed on Sunday, 27 December 2020, 7:19 PM

Time taken 12 mins 14 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

For the functions, n^k and c^n , what is the asymptotic relationship between these functions?

Assume that $k \geq 1$ and $c > 1$ are constants

Select one:

- a. n^k is $O(c^n)$ ✓
- b. n^k is $\Omega(c^n)$
- c. n^k is $\Theta(c^n)$

Your answer is correct.

The correct answer is: n^k is $O(c^n)$

Question 2

Correct

Mark 1.00 out of 1.00

What is the time complexity of the following code?

```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

Select one:

- a. $O(N)$
- b. $O(N * \log(N))$
- c. $O(N^2)$ ✓
- d. $O(N * \sqrt{N})$

Your answer is correct.

The correct answer is: $O(N^2)$



Question 3

Correct

Mark 1.00 out
of 1.00

Express the function $\frac{n^3}{1000} - 100n^2 - 100n + 3$ in terms of Θ -notation.

Select one:

- a. $\Theta(n^2)$
- b. $\Theta(\log(n))$
- c. $\Theta(n^3)$ ✓
- d. $\Theta(\sqrt{n})$

Your answer is correct.

The correct answer is: $\Theta(n^3)$

Question 4

Correct

Mark 1.00 out
of 1.00

The space factor when determining the efficiency of algorithm is measured by

Select one:

- a. Counting the maximum memory needed by the algorithm ✓
- b. Counting the maximum disk space needed by the algorithm
- c. Counting the minimum memory needed by the algorithm
- d. Counting the average memory needed by the algorithm

Your answer is correct.

The correct answer is: Counting the maximum memory needed by the algorithm

Question 5

Correct

Mark 1.00 out
of 1.00

Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?

Select one or more:

- a. $\Theta(n^4)$
- b. $O(n^4)$ ✓
- c. $o(n^3)$
- d. $\Omega(n^2)$ ✓
- e. $\omega(n^3)$

Your answer is correct.

The correct answers are: $O(n^4), \Omega(n^2)$

Question 6

Correct

Mark 1.00 out
of 1.00

Select the factors that are considered for analyzing algorithms.

Select one or more:

- a. Amount of work done ✓
- b. Amount of memory used ✓
- c. Amount of Memory available
- d. HDD Space

Your answer is correct.

The correct answers are: Amount of work done, Amount of memory used

Question 7

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
    for (j = 2; j <= N; j = j * 2) {
        k = k + N/ 2;
    }
}
```

Select one:

- a.
 $O(N \log(N))$ ✓
- b. $O(N^N)$
- c.
 $O(N)$
- d. $O(N \sqrt{N})$

Your answer is correct.

The correct answer is:

$O(N \log(N))$

Question 8

Correct

Mark 1.00 out
of 1.00

The worst case complexity of merge sort algorithm is

Select one:

- a. $O(n \log(n))$ ✓
- b. $O(\log(n))$
- c. $O(n^2)$
- d. $O(n)$

Your answer is correct.

The correct answer is: $O(n \log(n))$

Question 9

Correct

Mark 1.00 out
of 1.00

The worst case complexity of linear search algorithm is

Select one:

- a. $O(n \log(n))$
- b. $O(n^2)$
- c. $O(\log n)$
- d. $O(n) \checkmark$

Your answer is correct.

The correct answer is: $O(n)$

Question 10

Incorrect

Mark 0.00 out
of 1.00

Let $f(n) = 7n + 8$ and $g(n) = n$, find c (a suitable constant)
such that $O(g(n)) = f(n)$ for $n \geq n_0$

Select one:

- a. 8
- b. There is no such constant
- c. 7 ✗

Your answer is incorrect.

The correct answer is: 8

PREVIOUS ACTIVITY

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NEXT ACTIVITY

Lecture Slides : Recursion
and Divide and Conquer
(PPTX) ►

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Started on Saturday, 9 January 2021, 6:33 PM

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Completed on Saturday, 9 January 2021, 6:46 PM

Time taken 12 mins 32 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Recursion is a method in which the solution of a problem depends on

Select one:

- a. Larger instances of the same problem
- b. Larger instances of different problems
- c. Smaller instances of the same problem ✓
- d. Smaller instances of different problems

Your answer is correct.

The correct answer is: Smaller instances of the same problem

Question 2

Correct

Mark 1.00 out of 1.00

Which of the following problems can be solved using recursion?

Select one:

- a. Factorial of a number
- b. Nth Fibonacci number
- c. Length of a string
- d. All of the mentioned ✓

Your answer is correct.

The correct answer is: All of the mentioned

Question 3

Correct

Mark 1.00 out of 1.00

In recursion, the condition for which the function will stop calling itself is _____.

Select one:

- a. There is no such condition
- b. Base case ✓
- c. Best case
- d. Worst case

Your answer is correct.

The correct answer is: Base case



Question 4

Incorrect

Mark 0.00 out
of 1.00

Iteration and [Recursion](#) are the same programming approach

Select one:

- True ✕
 False

In [recursion](#), the function calls itself till the base condition is reached whereas iteration means repetition of process for example in for-loops.

The correct answer is 'False'.

Question 5

Correct

Mark 1.00 out
of 1.00

Algorithm(s) which use divide and conquer approach

Select one or more:

- a. Merge sort ✓
 b. Selection Sort
 c. Insertion Sort
 d. Binary search ✓

Your answer is correct.

The correct answers are: Binary search, Merge sort

Question 6

Correct

Mark 1.00 out
of 1.00

Output of the following program is?

```
void function( int n)
```

```
{
```

```
    if(n==0)
```

```
        return;
```

```
    printf("%d ",n*2);
```

```
    function(n-1);
```

```
}
```

```
int main()
```

```
{
```

```
    function(100);
```

```
    return 0;
```

```
}
```

Select one:

- a. 100, 99, 98, 97, 0
 b. 100
 c. 200, 198, 196, 194, 2 ✓
 d. 200, 199, 198, 197, 1

Your answer is correct.

The correct answer is: 200, 198, 196, 194, 2

Question 7

Correct

Mark 1.00 out
of 1.00

Consider Following Code

```
void my_recursive_function()
{
    my_recursive_function();
}
```

```
int main()
{
    my_recursive_function();
    return 0;
}
```

What will happen when the above snippet is executed?

Select one:

- a. The code will run for some time and stop when the stack overflows ✓
- b. The code will be executed successfully and no output will be generated
- c. The code will show a compile time error
- d. The code will be executed successfully and random output will be generated

Your answer is correct.

The correct answer is: The code will run for some time and stop when the stack overflows

Question 8

Correct

Mark 1.00 out
of 1.00

Consider a situation where you don't have function to calculate power (pow() function in C) and you need to calculate x^n where x can be any number and n is a positive integer. What can be the best possible time complexity of your power function?

Select one:

- a. $O(\text{Log}n)$ ✓
- b. $O(n\text{Log}n)$
- c. $O(n)$
- d. $O(\text{Log}\text{Log}n)$

Your answer is correct.

Power of a number can be calculated recursively.

Refer <https://www.geeksforgeeks.org/write-a-c-program-to-calculate-powxn/>

The correct answer is: $O(\text{Log}n)$

Question 9

Correct

Mark 1.00 out
of 1.00

Select the incorrect statement(s) about [recursion](#)?

Select one or more:

- a. Every recursive function need to have a base case
- b. Infinite [recursion](#) can happen if the base case isn't properly declared
- c. A recursive function makes the code easier to understand
- d. Every recursive function need to have a return value ✓

Your answer is correct.

The correct answer is: Every recursive function need to have a return value

Question 10

Correct

Mark 1.00 out
of 1.00

Worst case time complexity of Merge Sort

Select one:

- a. $O(n \log(n))$ ✓
- b. $O(n)$
- c. $O(n^2)$
- d. $O(\log(n))$

Your answer is correct.

The correct answer is: $O(n \log(n))$

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◀ Zeetings : L3
Recursion and Divide
and Conquer

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NEXT ACTIVITY

Lecture Slides: Analyzing
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4(b) Complexity Analysis - Analyzing Recursion II

[Quiz 4](#)

Started on Friday, 22 January 2021, 11:44 PM

State Finished

Completed on Saturday, 23 January 2021, 12:09 AM

Time taken 24 mins 47 secs

Marks 15.00/15.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Which is not a method for analyzing time complexity of recurrences?

Select one:

- a. Substitution Method
- b. Recurrence Tree Method
- c. Amortized Method ✓
- d. Master Method

Your answer is correct.

The correct answer is: Amortized Method

Question 2

Correct

Mark 1.00 out
of 1.00

What is the most appropriate base case for a recursive function to calculate the factorial of a number?

$$\text{fac}(n) = n * (n-1) * \dots * 1$$

Note: Factorial of zero is defined to be 1. The above function should be able to satisfy $\text{fac}(0)$ as well.

Select one:

- a. $n == 0$
- b. $n >= 0$
- c. $n <= 1$ ✓
- d. $n == 1$

Your answer is correct.

The correct answer is: $n \leq 1$



Question 3

Correct

Mark 1.00 out
of 1.00

There are n people born between the year 1000 A.D and 2018 A.D, is it possible to sort them by birthdate in $O(n \log(n))$ time.

Select one:

- True ✓
 False

Birthdate can be represented in a number format in a database, then we can use **Merge Sort** to sort them by birthdate.

The correct answer is 'True'.

Question 4

Correct

Mark 1.00 out
of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

- a. It has a linear time complexity and a linear space complexity.
 b. It has a double linear complexity.
 c. It has a linear time complexity. ✓
 d. It has a double linear time complexity.

Your answer is correct.

The correct answer is: It has a linear time complexity.

Question 5

Correct

Mark 1.00 out
of 1.00

Given a set of integers, the number of comparisons necessary to find the maximum element is $n-1$ and the number of comparisons necessary to find the minimum element is $n-1$. Therefore the number of comparisons necessary to simultaneously find the smallest and the largest elements is $2n - 2$

Select one:

- True
 False ✓

The correct answer is 'False'.



Question 6

Correct

Mark 1.00 out
of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

- True
- False ✓

False.

Case 3 of the master theorem applies:

$f(n) = O(n^{\log_3 3}) = O(n)$ for $f(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.

Question 7

Correct

Mark 1.00 out
of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Solve for constants

Step 3 ✓

Guess the form of the solution

Step 1 ✓

Verify by induction

Step 2 ✓

Your answer is correct.

The correct answer is: Solve for constants → Step 3, Guess the form of the solution → Step 1, Verify by induction → Step 2

Question 8

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for run time $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 3T(n/2) + n$$

Select one:

- a. Master Theorem does not apply.
- b. $T(n) = n \log(n)$
- c. $T(n) = \Theta(n^{\lg 3})$ ✓
- d. $T(n) = \Theta(n^2)$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{\lg 3})$

Question 9

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 2T(n/3) + nlgn$$

Select one:

a. $T(n) = \Theta(n^2 \lg(n))$

b. $T(n) = \Theta(n \lg(n))$



c. $T(n) = \Theta(\lg(n))$

d. $T(n) = \Theta(n)$

The correct answer is: $T(n) = \Theta(n \lg(n))$

Question 10

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 3T(n/5) + \lg^2(n)$$

Select one:

a. $T(n) = \Theta(n^{\log_3(5)})$

b. $T(n) = \Theta(\lg^2(n))$

c. $T(n) = \Theta(\log_2(n))$

d. $T(n) = \Theta(n^{\log_5(3)})$



Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{\log_5(3)})$

Question 11

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = T(n/2) + 2^n$$



Question 12

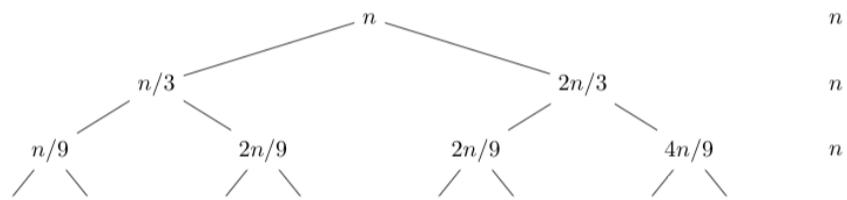
Correct

Mark 1.00 out
of 1.00

Recursion Tree is one way to analyze recursive functions.
Consider a function with following time complexity.

$$T(n) = T(n/3) + T(2n/3) + n$$

Following figure shows the first 3 levels of the recursion tree.



What is/are the number(s) which can appear in the next (4th) level in this recursion tree?

Select one or more:

- a. $16n/27$
- b. $8n/27$ ✓
- c. $2n/27$ ✓
- d. $n/27$ ✓

Your answer is correct.

The correct answers are: $n/27, 2n/27, 8n/27$



Question 13

Correct

Mark 1.00 out
of 1.00

Find the solution to following recurrence equation:

$$f(n) = \begin{cases} 1 & \text{if } n=1 \\ 1+f(\lfloor n/2 \rfloor) & \text{if } n \geq 2 \end{cases}$$

Select one:

- a. $f(n) = n \log(n)$
- b. $f(n) = \log(n)$
- c. $f(n) = \lfloor \log(n+1) \rfloor$
- d. $f(n) = \lfloor \log(n) \rfloor + 1$



The correct answer is: $f(n) = \lfloor \log(n) \rfloor + 1$

Question 14

Correct

Mark 1.00 out
of 1.00

Solve the following Recursive Algorithm:

$$\begin{aligned} T(n) = & \left\{ \begin{array}{l} 2T\left(\frac{n}{2}\right) + \text{prime}(n) \\ \text{if } n > 1 \\ 1 \text{ if } n = 1 \end{array} \right. \end{aligned}$$

Select one:

- a. $T(n) = O(n)$
- b. $T(n) = O(\log(n))$
- c. $T(n) = O(n^2)$
- d. $T(n) = O(n \log(n))$



Your answer is correct.

The correct answer is: $T(n) = O(n \log(n))$



Question 15

Correct

Mark 1.00 out
of 1.00

Given a set 'S' of n integers and another integer x, an algorithm should determine whether or not there exists two elements in S whose sum is exactly x . A possible algorithm for this task is described below.

- 1) Sort the elements in S using any efficient sorting algorithm.
- 2) Remove the last element from S. Let y be the value of the removed element.
- 3) If S is non-empty, look whether an element z exist in S where $z=x-y$
- 4) If S contains such an element z, then stop, since we have found y and z such that $x=y+z$; otherwise repeat Step 2.
- 5) If S is empty, then no two elements in S sum to x.

Select the correct statement(s) regarding above approach.

Select one or more:

- a. Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity. ✓
- b. Best time complexity to do Step 3 is $\Theta(n)$.
- c. Time complexity of this algorithm is $\Theta(n \lg n)$. ✓
- d. There are algorithms which can solve this task with better time complexity than above described algorithm

Your answer is correct.

The correct answers are: Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity., Time complexity of this algorithm is $\Theta(n \lg n)$.

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Started on Thursday, 28 January 2021, 1:33 AM

State Finished

Completed on Thursday, 28 January 2021, 1:44 AM

Time taken 11 mins 34 secs

Marks 11.00/12.00

Grade 9.17 out of 10.00 (92%)

Question 1

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding arrays and list

Select one or more:

- a. One advantage of the array compared to list is the ability to perform random access without additional data structures. ✓
- b. In a List, elements are spread about in memory, but linked together. ✓
- c. Insertion is easier in the array compared to list.
- d. Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array. ✓

Your answer is correct.

The correct answers are: Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array., One advantage of the array compared to list is the ability to perform random access without additional data structures., In a List, elements are spread about in memory, but linked together.

Question 2

Correct

Mark 1.00 out
of 1.00

How many comparisons needed to search a singly linked list of length n for a given element in the worst case,

Select one:

- a. n ✓
- b. n/2
- c. 2n
- d. Log2 n – 1

The correct answer is: n



Question 3

Correct

Mark 1.00 out
of 1.00

Choose the output of the following code segment on python list

:

$A=[1,2,3,4,5,6,7,8,9]$

$A[::2]=10,20,30,40,50,60$

$\text{Print}(A)$

Select one:

- a. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]
- b. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
- c. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓
- d. [1, 2, 10, 20, 30, 40, 50, 60]

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5

Question 4

Correct

Mark 1.00 out
of 1.00

What does 'stack overflow' mean by :

Select one:

- a. Inserting a large amount of data that is larger than the available memory
- b. Inserting new items to a full stack ✓
- c. Deleting an item from an empty stack
- d. Accessing an undefined item from stack

The correct answer is: Inserting new items to a full stack

Question 5

Correct

Mark 1.00 out
of 1.00

Which of the following is/are advantages of abstract data types(ADT)

Select one:

- a. ADT abstracts away from a specific representation to focus on the semantic meaning of the data
- b. An AST may have different implementations of it with different performance characteristics. So, for different use cases, specific implementations of an ADT that will be more efficient for that use case can be used.
- c. When an AST is used in a program, most of the program becomes independent of that abstract data type's representation, so that representation can be improved without breaking the entire program.
- d. All are correct ✓

Your answer is correct.

The correct answer is: All are correct

Question 6

Correct

Mark 1.00 out
of 1.00

Which of the following statement is wrong regarding Python lists and arrays.

Select one:

- a. Both can be indexed and iterated through
- b. Both can be sliced
- c. A Python array with numbers can be divided by a certain number while doing same on python list will result in Type error.
- d. All statements are correct ✓

Your answer is correct.

The correct answer is: All statements are correct

Question 7

Incorrect

Mark 0.00 out
of 1.00

The data structure required to check whether an expression contains balanced parenthesis is?

Select one:

- a. Tree ✗
- b. Array
- c. Queue
- d. Stack

Your answer is incorrect.

The correct answer is: Stack

Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding implementing data structures

Select one or more:

- a. A stack can be implemented using two queues. ✓
- b. A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time ✓
- c. A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time ✓
- d. A queue can be implemented using two stacks. ✓

Your answer is correct.

The correct answers are: A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time, A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time, A queue can be implemented using two stacks., A stack can be implemented using two queues.

Question 9

Correct

Mark 1.00 out
of 1.00

Choose a statement about stacks that is not correct?

Select one:

- a. Pop and push are the primary operations used in stacks
- b. Top of the stack always contains the latest item
- c. Linked list are used for implementing stacks
- d. Stack is a FIFO data structure ✓

The correct answer is: Stack is a FIFO data structure

Question 10

Correct

Mark 1.00 out
of 1.00

In linked list implementation of queue, if only front pointer is maintained, which of the following operation take worst case linear time?

Select one:

- a. To empty a queue
- b. Deletion
- c. Both Insertion and To empty a queue ✓ Since front pointer is used for deletion, so worst time for the other two cases.
- d. Insertion

Your answer is correct.

The correct answer is: Both Insertion and To empty a queue

Question 11

Correct

Mark 1.00 out
of 1.00

Which one of the following is a queue

Select one:

- a. LIFO list
- b. Array
- c. FIFO list ✓
- d. Multi dimensional array

The correct answer is: FIFO list

Question 12

Correct

Mark 1.00 out
of 1.00

Consider the following postfix notations and find out the answer using stack operations:

8, 14, 6, +, *, 8, 40, 20, /, +, * is?

Select one:

- a. 160
- b. 1600 ✓
- c. 16
- d. 16000

The correct answer is: 1600





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Started on Sunday, 14 February 2021, 7:25 PM

State Finished

Completed on Sunday, 14 February 2021, 7:33 PM

Time taken 7 mins 28 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Which of the following binary trees are BSTs?

(1) (2) (3) (4)

A 10 cat 15

/ \ / / \ / \

B C 5 bat rat 5 22

/ / \ \

-3 ant 20 30

Select one:

- a. 1,4
- b. 2,4
- c. None of these
- d. 2,3 ✓

Your answer is correct.

The correct answer is: 2,3

Question 2

Correct

Mark 1.00 out of 1.00

What is the number of internal nodes of a complete k-ary tree?

Select one:

- a. $k^{(h-1)}$
- b. $(k^h - 1)/k$
- c. $(k^h - 1)/(k - 1)$
- d. $(h^k - 1)/(h - 1)$

✓

Your answer is correct.

The correct answer is: $(k^h - 1)/(k - 1)$



Question 3

Correct

Mark 1.00 out
of 1.00

By which Factor does the Binary Search Narrows the Search?

Select one:

- a. Two (2) times at each iteration ✓
- b. Four (4) times at each iteration
- c. Two (2) times at each search operation
- d. Does not narrow the search by any factor

The correct answer is: Two (2) times at each iteration

Question 4

Correct

Mark 1.00 out
of 1.00

The height of a tree is the length of the longest root-to-leaf path in it. The maximum and the minimum number of nodes in a binary tree of height 5 are:

Select one:

- a. 64 and 5, respectively
- b. 32 and 6, respectively
- c. 31 and 5, respectively
- d. 63 and 6, respectively ✓

Your answer is correct.

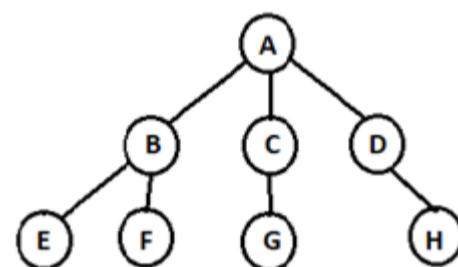
The correct answer is: 63 and 6, respectively

Question 5

Correct

Mark 1.00 out
of 1.00

What is(are) the leaf node(s) in the following K-ary Tree



Select one or more:

- a. F ✓
- b. A
- c. B
- d. G ✓

Your answer is correct.

The correct answers are: F, G

Question 6

Incorrect

Mark 0.00 out
of 1.00

You were asked to implement program to store information about the items on display at a museum. Which one is the right data structure to use?

Select one:

- a. Database
- b. Binary search tree ✗
- c. Sorted array
- d. It depends

Your answer is incorrect.

The correct answer is: It depends

Question 7

Correct

Mark 1.00 out
of 1.00

Select whether the following statement is True/False.

Binary Search is appropriate for linked lists

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 8

Correct

Mark 1.00 out
of 1.00

What is the running time of Linear Search when all the elements in a list are sorted?

n – Number of Elements in List

Select one:

- a. $O(n \log n)$
- b. $O(n^2)$
- c. $O(n)$
✓
- d. $O(\log n)$

The correct answer is: $O(n)$

Question 9

Correct

Mark 1.00 out
of 1.00

What is the largest number of nodes BST can have with depth of 3

Answer: 15



The correct answer is: 15

Question 10

Correct

Mark 1.00 out
of 1.00

What is the **branching factor** of Binary Search Tree?

Select one:

- a. 1
- b. 4
- c. 3
- d. 2 ✓

The correct answer is: 2

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Search Trees

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Zeetings : L6 Binary
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Started on Friday, 19 February 2021, 7:32 PM

State Finished

Completed on Friday, 19 February 2021, 7:38 PM

Time taken 6 mins 8 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Consider a binary min heap containing n elements and every node is having degree 2 (i.e. full binary min heap tree). What is the probability of finding the largest element at the last level ?

Select one:

- a. $1/2$
- b. 1 ✓
- c. $1/2^n$
- d. $1/n$

Your answer is correct.

The correct answer is: 1

Question 2

Correct

Mark 1.00 out of 1.00

Which of the following is not a standard in-place sorting algorithm?

Select one:

- a. Merge sort ✓
- b. Selection sort
- c. Heap sort
- d. Quick sort

The correct answer is: Merge sort

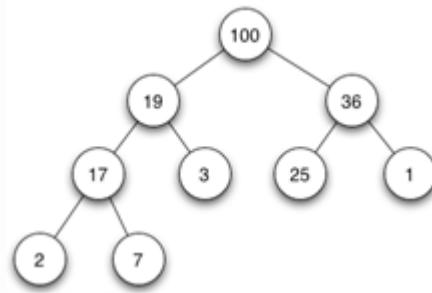


Question 3

Correct

Mark 1.00 out
of 1.00

If we implement heap as Max-Heap, adding a new node of value 15 to the leftmost node of the right sub tree. What value will be at leaf nodes of the right sub tree of the heap?



Select one:

- a. 2 and 3
- b. 15 and 1 ✓
- c. 3 and 1
- d. 25 and 1

The correct answer is: 15 and 1

Question 4

Correct

Mark 1.00 out
of 1.00

Does heap exhibit the properties of a binary tree?

Select one:

- True ✓
- False

The correct answer is 'True'.

Question 5

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of HeapExtract operation?

Select one:

- a. $O(\log(n))$ ✓
- b. $O(n)$
- c. $O(n^2)$
- d. $O(n \log(n))$

The correct answer is: $O(\log(n))$

Question 6

Correct

Mark 1.00 out
of 1.00

Which of the following sorting algorithms has the least worst-case running time?

Select one or more:

- a. Bubble Sort
- b. Heapsort ✓
- c. Insertion Sort
- d. Merge Sort ✓

The correct answers are: Merge Sort, Heapsort

Question 7

Correct

Mark 1.00 out
of 1.00

What is the typical running time of a heap sort algorithm?

Select one:

- a. $O(N)$
- b. $O(\log N)$
- c. $O(N^2)$
- d. $O(N \log N)$ ✓ The total running time of a heap sort algorithm is mathematically found to be $O(N \log N)$.

Your answer is correct.

The correct answer is: $O(N \log N)$

Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following is the recurrence relation for Heapify Operation?

Select one:

- a. $T(n) \leq T(n/2) + \Theta(1)$
- b. $T(n) \leq T(3n/2) + \Theta(1)$
- c. $T(n) \leq T(2n/3) + \Theta(1)$



- d. $T(n) \leq T(2n/3) + \Theta(n)$

The correct answer is: $T(n) \leq T(2n/3) + \Theta(1)$

Question 9

Correct

Mark 1.00 out
of 1.00

BUILD-MIN-HEAP(A)

```
A.heapsize = A.length
for i = A.length/2 down to 1
    MIN-HEAPIFY(A,i)
```

Running time for the "MIN-HEAPIFY" operation is $O(\log n)$. What is the time complexity of "BUILD-MIN-HEAP" operation.

Select one:

- a. $O(n)$ ✓
- b. $O(n \log n)$
- c. $O(n^2 \log n)$
- d. $O(\log n^2)$

Your answer is correct.

<https://www.growingwiththeweb.com/data-structures/binary-heap/build-heap-proof/>

The correct answer is: $O(n)$

Question 10

Incorrect

Mark 0.00 out
of 1.00

What is the worst-time complexity of HEAPSORT operation?

Select one:

- a. $O(n^2)$
- b. $O(n \log(n))$
- c. $O(\log(n))$ ✗
- d. $O(n)$

The correct answer is: $O(n \log(n))$

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Started on Friday, 5 March 2021, 7:04 PM

State Finished

Completed on Friday, 5 March 2021, 7:11 PM

Time taken 7 mins 15 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Best methods used in collision handling is/are

Select one or more:

- a. Double hashing ✓
- b. Quadratic probing
- c. Chaining ✓
- d. Linear probing

The correct answers are: Chaining, Double hashing

Question 2

Correct

Mark 1.00 out of 1.00

The time complexity of all operations associated with Direct Address table are not $O(1)$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 3

Correct

Mark 1.00 out of 1.00

What is the load factor?

Select one:

- a. Average hash table length
- b. Average array size
- c. Average chain length ✓ In simple chaining, load factor is the average number of elements stored in a chain, and is given by the ratio
- d. Average key size

Your answer is correct.

The correct answer is: Average chain length



Question 4

Correct

Mark 1.00 out
of 1.00

Hash table is?

Select one:

- a. A structure that maps values to keys
- b. A structure that maps keys to values ✓
- c. A structure used to implement stack and queue
- d. A structure used for storage

The correct answer is: A structure that maps keys to values

Question 5

Correct

Mark 1.00 out
of 1.00

Suppose we have an empty **Hash Table**, where $H(k) = k \% M$ and $M = 7$. After inserting the keys 31, 77, and 708 into our **Hash Table** (in that order), which index will the key 49 end up hashing to using the collision resolution strategy of **Linear Probing**?

Answer: 2



Collusion occurs at index 0, since index 1 is already occupied(708), the answer is 2

The correct answer is: 2

Question 6

Correct

Mark 1.00 out
of 1.00

Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function $x \bmod 10$, which of the following statements are true?

- i. 9679, 1989, 4199 hash to the same value
- ii. 1471, 6171 has to the same value
- iii. All elements hash to the same value
- iv. Each element hashes to a different value

Select one:

- a. i and ii only ✓
- b. ii only
- c. iii or iv
- d. i only

Your answer is correct.

The correct answer is: i and ii only

Question 7

Incorrect

Mark 0.00 out
of 1.00

Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, select the resulting tables after inserting the values in the given order with linear probing.

Select one:

- a. 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]
- b. 0 [3920] 1 [430] 2 [22] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- c. 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234] ✖
- d. 0 [430] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [397] 6 [4234]

The correct answer is: 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]

Question 8

Correct

Mark 1.00 out
of 1.00

Possible hash function to store string in hash table is the string's length, $h(x) = x.length$. This a good hash function.

Select one:

- True
- False ✓

Strings with the same length will have the same hash code. If we insert lots of strings with the same length, lookup will take $O(n)$ time instead of $O(1)$

The correct answer is 'False'.

Question 9

Correct

Mark 1.00 out
of 1.00

Which one of the following hash functions on integers will distribute keys most uniformly over 10 buckets numbered 0 to 9 for i ranging from 0 to 20?

Select one:

- a. $h(i) = (11 * i^2) \bmod 10$
- b. $h(i) = (12 * i) \bmod 10$
- c. $h(i) = i^3 \bmod 10$ ✓
- d. $h(i) = i^2 \bmod 10$

The correct answer is: $h(i) = i^3 \bmod 10$

Question 10

Correct

Mark 1.00 out
of 1.00

Using division method, in a given hash table of size 157, the key of value 172 be placed at position

Select one:

- a. 19
- b. 17
- c. 15 ✓
- d. 72

Your answer is correct.

The correct answer is: 15

PREVIOUS ACTIVITY

◀ Lecture Slides:
HashTables

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NEXT ACTIVITY

Hashtable Demo ►



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Started on Wednesday, 24 March 2021, 11:03 AM

State Finished

Completed on Wednesday, 24 March 2021, 11:12 AM

Time taken 9 mins 19 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Breadth First Search is equivalent to which of the traversal in the Binary Trees?

Select one:

- a. Pre-order Traversal
- b. Post-order Traversal
- c. In-order Traversal
- d. None of the above ✓

Your answer is correct.

The correct answer is: None of the above

Question 2

Correct

Mark 1.00 out of 1.00

The Data structure used in standard implementation of Breadth First Search is?

Select one:

- a. Tree
- b. Queue ✓
- c. Linked List
- d. Stack

Your answer is correct.

The correct answer is: Queue

Question 3

Correct

Mark 1.00 out of 1.00

Time Complexity of Depth First Search is:

Select one:

- a. $O(V / E)$
- b. $O(V + E)$ ✓
- c. $O(\log(V + E))$
- d. $O(V * E)$

Your answer is correct.

The correct answer is: $O(V + E)$

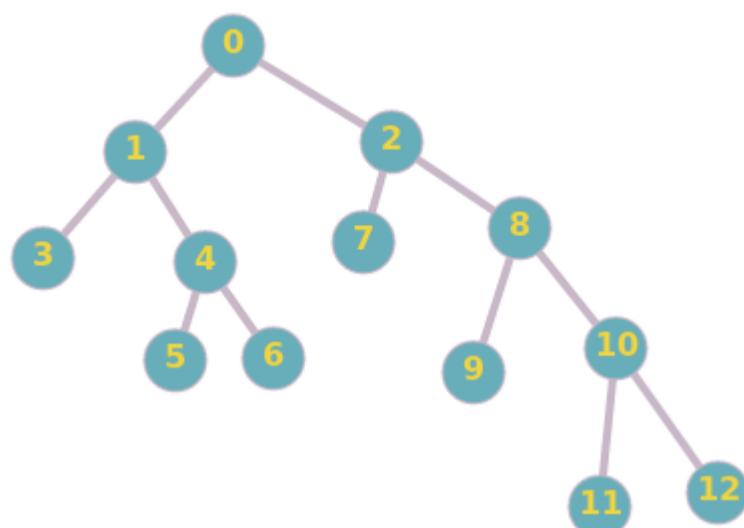


Question 4

Correct

Mark 1.00 out
of 1.00

Find the output of Depth-First search of the following tree using Post-order traversal:



Select one:

- a. 0 1 3 4 5 6 2 7 8 9 10 11 12
- b. 0 1 2 3 4 7 8 5 6 9 10 11 12
- c. 3 1 5 4 6 0 7 2 9 8 11 10 12
- d. 3 5 6 4 1 7 9 11 12 10 8 2 0 ✓

Your answer is correct.

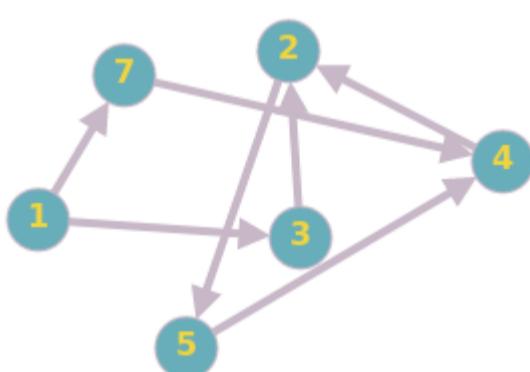
The correct answer is: 3 5 6 4 1 7 9 11 12 10 8 2 0

Question 5

Correct

Mark 1.00 out
of 1.00

Find an output of a Breadth-First Traversal of the following graph starting from Node 1:



Select one:

- a. 1 3 2 5 4 7
- b. 1 3 7 2 4 5 ✓
- c. 1 3 7 4 2 5
- d. 1 7 3 4 2 5

Your answer is correct.

The correct answer is: 1 3 7 2 4 5

Question 6

Correct

Mark 1.00 out
of 1.00

Time Complexity of Breadth First Search is:

Select one:

- a. $O(V + E)$ ✓
- b. $O(V * E)$
- c. $O(\log(V + E))$
- d. $O(V / E)$

Your answer is correct.

The correct answer is: $O(V + E)$

Question 7

Correct

Mark 1.00 out
of 1.00

Correct choice of data structures can improve the performance of algorithms. Match the following algorithms with appropriate data structures

Depth first search

Stack ✓

Sorting

Heap ✓

Breadth first search

Queue ✓

Your answer is correct.

Among the given choices, queue is the most appropriate for BFS, stack for DFS and heap for sorting

The correct answer is: Depth first search → Stack, Sorting → Heap, Breadth first search → Queue

Question 8

Correct

Mark 1.00 out
of 1.00

The degree of a vertex of a graph is the number of edges that are incident to the vertex. Which of the following statement(s) is/are true regarding degree of vertices of a undirected graph?

Select one or more:

- a. Total number of vertices with odd number of degrees is even. ✓
- b. Sum of degrees of all vertices = 2 * Total number of edges ✓
- c. A graph can exist such that its total number of vertices is 25 and all the vertices are connected with exactly 7 other vertices
- d. Total number of vertices with even number of degrees is odd

Your answer is correct.

The correct answers are: Total number of vertices with odd number of degrees is even., Sum of degrees of all vertices = 2 * Total number of edges



Question 9

Correct

Mark 1.00 out
of 1.00

Traversal of a graph is different than tree because.

Select one:

- a. There can be a loop in the graph ✓
- b. DFS on a graph uses stack, while inorder traversal is recursive
- c. Both (a) and (b)
- d. None of the above

Your answer is correct.

The correct answer is: There can be a loop in the graph

Question 10

Correct

Mark 1.00 out
of 1.00

Regarding implementation of Breadth First Search using queues, at a given time, what is the maximum difference between depth of any two nodes present in the queue?

Select one:

- a. Insufficient Information
- b. Can be anything
- c. Atmost 1 ✓
- d. 0

Your answer is correct.

The correct answer is: Atmost 1

PREVIOUS ACTIVITY

◀ Lecture Slides:
Introduction to Graphs

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NEXT ACTIVITY

Zeetings: Graphs
Introduction and
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Started on Saturday, 27 March 2021, 7:43 PM

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Completed on Saturday, 27 March 2021, 7:55 PM

Time taken 11 mins 59 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

A spanning tree for an undirected graph G is

Select one or more:

- a. An undirected graph ✓
- b. Contains all the edges of G ,
- c. A connected graph ✓
- d. Has no cycles ✓

Your answer is correct.

The correct answers are: An undirected graph, Has no cycles, A connected graph

Question 2

Correct

Mark 1.00 out of 1.00

Consider a minimum spanning tree (T) obtained from an undirected graph. Can you use the tree to visit each vertex in the graph from a given origin?

Select one:

- True ✓
- False

The correct answer is 'True'.

Question 3

Correct

Mark 1.00 out of 1.00

Select the two basic properties of Spanning Tree.

Select one or more:

- a. Acyclic ✓
- b. Connected ✓
- c. Not Connected
- d. Cyclic

The correct answers are: Connected, Acyclic



Question 4

Correct

Mark 1.00 out
of 1.00

Edges of a DFS can be classified as tree edge, back edge, forward edge and cross edge. Which types of edges are present in the DFS of an undirected graph

Select one or more:

- a. Cross edges
- b. Back edges ✓
- c. Tree edges ✓
- d. Forward edges

Your answer is correct.

The correct answers are: Tree edges, Back edges

Question 5

Correct

Mark 1.00 out
of 1.00

Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. W_{ij} entry in the matrix W below is the weight of the edge {i, j}. What is the minimum possible weight of a spanning tree T in this graph such that vertex 0 is a leaf node in the tree T?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 10 ✓
- b. 7
- c. 8
- d. 9

The correct answer is: 10

Question 6

Correct

Mark 1.00 out
of 1.00

An undirected graph G has n nodes. Its adjacency matrix is given by an $n \times n$ square matrix whose (i) diagonal elements are 0's and (ii) non-diagonal elements are 1's.

Which one of the following is TRUE?

Select one:

- a. Graph G has multiple distinct MSTs, each of cost $n-1$ ✓
- b. Graph G has multiple spanning trees of different costs
- c. Graph G has no minimum spanning tree (MST)
- d. Graph G has a unique MST of cost $n-1$

The correct answer is: Graph G has multiple distinct MSTs, each of cost $n-1$

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a complete undirected graph with vertex set $\{0, 1, 2, 3, 4\}$. W_{ij} entry in the matrix W below is the weight of the edge $\{i, j\}$.

In the graph given, what is the minimum possible weight of a path P from vertex 1 to vertex 2 in this graph such that P contains at most 3 edges?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 8 ✓
- b. 10
- c. 7
- d. 9

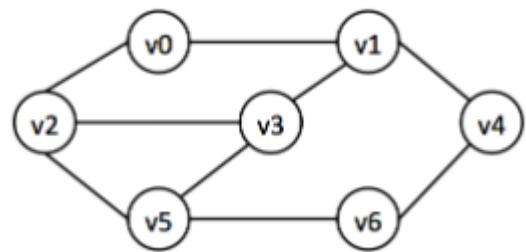
The correct answer is: 8

Question 8

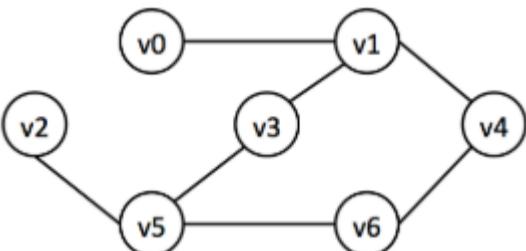
Incorrect

Mark 0.00 out
of 1.00

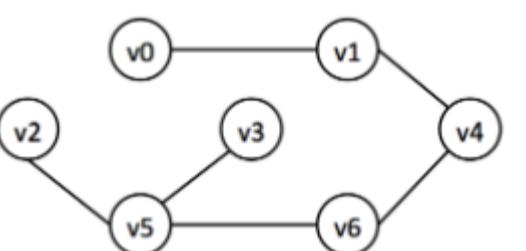
Select all valid **spanning trees** of the graph below



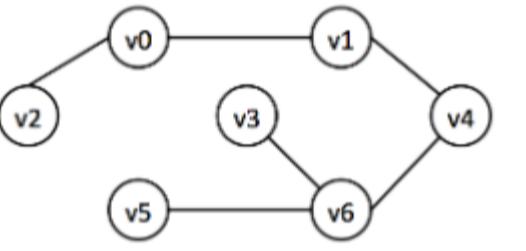
A)



B)



C)



Select one:

- a. Both B and C ✗
- b. It depends on the weight of the edges
- c. B only
- d. All A,B and C

Your answer is incorrect.

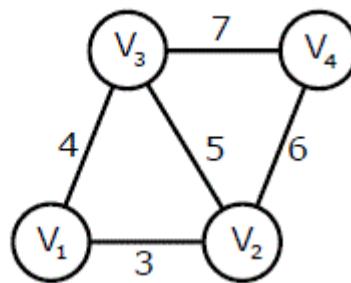
The correct answer is: B only

Question 9

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What will be the cost of the minimum spanning tree (MST) of such a graph with n nodes?

Select one:

- a. $2n + 1$
- b. $n^2 - n + 1$
- c. $\frac{1}{12}(11n^2 - 5n)$
- d. $6n - 11$



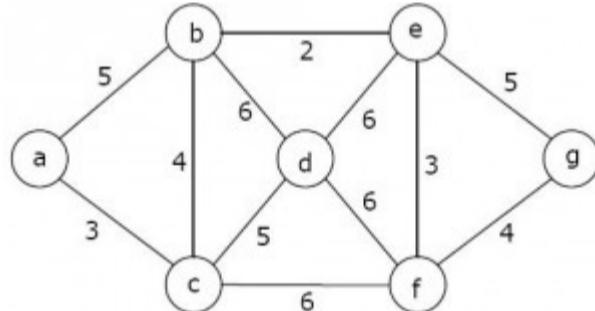
The correct answer is: $n^2 - n + 1$

Question 10

Correct

Mark 1.00 out
of 1.00

Which one of the following is NOT the sequence of edges added to the minimum spanning tree of the graph in the figure using Kruskal's algorithm?



Select one:

- a. (b,e)(e,f)(a,c)(f,g)(b,c)(c,d)
- b. (b,e)(e,f)(a,c)(b,c)(f,g)(c,d)
- c. (b,e)(a,c)(e,f)(b,c)(f,g)(c,d)
- d. (b,e)(e,f)(b,c)(a,c)(f,g)(c,d) ✓

The correct answer is: (b,e)(e,f)(b,c)(a,c)(f,g)(c,d)

PREVIOUS ACTIVITY

◀ Lecture Slides:
Minimum Spanning
Trees

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NEXT ACTIVITY

Lecture Slides: Single-
Source Shortest Path ►



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Started on Wednesday, 7 April 2021, 4:11 PM

State Finished

Completed on Wednesday, 7 April 2021, 4:20 PM

Time taken 9 mins 20 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

What is the worst case space complexity of Bellman Ford algorithm?

Select one:

- a. $O(|E| |V|)$
- b. $O(|V|^2)$
- c. $O(|E|)$
- d. $O(|V|)$ ✓

The correct answer is: $O(|V|)$

Question 2

Correct

Mark 1.00 out of 1.00

What is the time complexity of Dijkstra's shortest path algorithm?

Select one:

- a. $O(|E| \log |V|)$ ✓
- b. $O(|V|)$
- c. $O(|E| |V|)$
- d. $O(|V|^2)$

Your answer is correct.

The correct answers are: $O(|E| \log |V|)$, $O(|V|^2)$

Question 3

Correct

Mark 1.00 out of 1.00

The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Your answer is correct.

The correct answer is:

The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

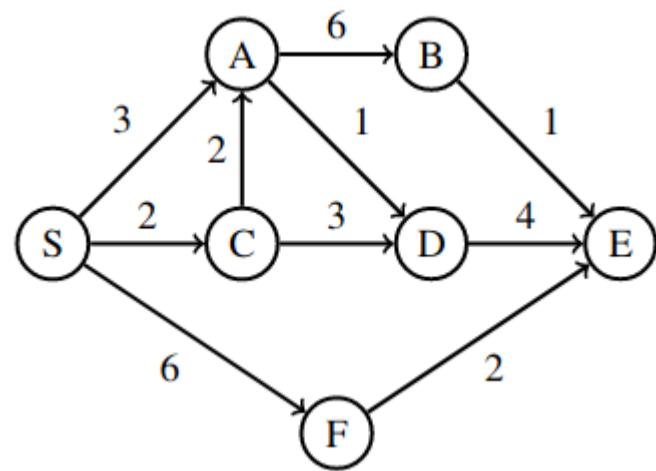


Question 4

Correct

Mark 1.00 out
of 1.00

Run Dijkstra's algorithm on the following directed graph, starting at vertex S. What is the order in which vertices get removed from the priority queue?



Select one:

- a. B, A, C, F, D, E, S
- b. S, A, C, F, D, E, B
- c. F, S, A, C, D, E, B
- d. S, C, A, D, F, E, B ✓

Your answer is correct.

The correct answer is: S, C, A, D, F, E, B

Question 5

Incorrect

Mark 0.00 out
of 1.00

Select the correct pseudo code to compute the shortest path in Dijkstra's algorithm?

Select one:

a.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase(T[w].Dist to T[v].Dist);
        T[w].path=v; }
```

b.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) > T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

✗

c.

```
if(T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Increase (T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

d.

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```

Your answer is incorrect.

The correct answer is:

```
if(!T[w].Known)
    if(T[v].Dist + C(v,w) < T[w].Dist)  {
        Decrease(T[w].Dist to T[v].Dist +C(v,w));
        T[w].path=v; }
```



Question 6

Correct

Mark 1.00 out
of 1.00

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all

same. - Breadth First Search ✓

2. For graphs where the edge-weights are non-

negative. - Dijkstra's Alogrithm ✓

3. For graphs where the edge-weights may be negative, but

no negative weight cycle

exists.

- Bellman-Ford Algorithm ✓

Your answer is correct.

The correct answer is:

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all same. - [Breadth First Search]

2. For graphs where the edge-weights are non-negative. - [Dijkstra's Alogrithm]

3. For graphs where the edge-weights may be negative, but no negative weight cycle exists.

- [Bellman-Ford Algorithm]

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a weighted directed graph $G = (V, E, w)$ and let X be a shortest $s-t$ path for $s, t \in V$. If we double the weight of every edge in the graph, setting $w'(e) = 2 w(e)$ for each $e \in E$, then X will still be a shortest $s - t$ path in (V, E, w') .

Select one:

True ✓

False

Any linear transformation of all weights maintains all relative path lengths, and thus shortest paths will continue to be shortest paths, and more generally all paths will have the same relative ordering. One simple way of thinking about this is unit conversions between kilometers and miles.

The correct answer is 'True'.

Question 8

Correct

Mark 1.00 out
of 1.00

Consider a weighted, directed acyclic graph $G = (V, E, w)$ in which edges that leave the source vertex s may have negative weights and all other edge weights are non-negative. Does Dijkstra's algorithm correctly compute the shortest-path weight $\delta(s, t)$ from s to every vertex t in this graph?

Select one:

- True ✓
 False

For the correctness of Dijkstra, it is sufficient to show that $d[v] = \delta(s, v)$ for every $v \in V$ when v is added to S . Given the shortest $s; v$ path and given that vertex u precedes v on that path, we need to verify that u is in S . If $u = s$, then certainly u is in S . For all other vertices, we have defined v to be the vertex not in S that is closest to s . Since $d[v] = d[u] + w(u, v)$ and $w(u, v) > 0$ for all edges except possibly those leaving the source, u must be in S since it is closer to s than v .

The correct answer is 'True'.

Question 9

Correct

Mark 1.00 out
of 1.00

Given a graph $G = (V, E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.

Select one:

- True ✓
 False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.

The correct answer is 'True'.

Question 10

Correct

Mark 1.00 out
of 1.00

A graph can have a negative weight cycle when?

Select one:

- a. The graph has 1 or more negative weighted edges
 b. The graph has 1 negative weighted edge
 c. The graph has a cycle
 d. The total weight of the graph is negative ✓

Your answer is correct.

When the total weight of the graph sums up to a negative number then the graph is said to have a negative weight cycle. Bellmann Ford Algorithm provides no solution for such graphs.

The correct answer is: The total weight of the graph is negative





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◀ Lecture Slides:
Single-Source Shortest
Path

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Lecture Slides: Algorithm
Design Techniques ►

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Started on Wednesday, 31 March 2021, 7:47 PM

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Completed on Wednesday, 31 March 2021, 7:54 PM

Time taken 7 mins 31 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Dynamic programming does not work if the subproblems:

Select one:

- a. Share resources and thus are not independent ✓
- b. Cannot be divided in half
- c. Overlap
- d. Have to be divided too many times to fit into memory

Your answer is correct.

The correct answer is: Share resources and thus are not independent

Question 2

Correct

Mark 1.00 out
of 1.00

A divide and conquer approach to solving a problem is useful when

Select one:

- a. The complexity is exponential to solve the entire problem
- b. None of the above
- c. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓
- d. The subproblems are overlapping so we don't have to solve them over and over again

Your answer is correct.

The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size



Question 3

Correct

Mark 1.00 out
of 1.00

Dynamic Programming is often used for (choose all that apply)

Select one or more:

- a. Problems previously solved using divide and conquer that have overlapping subproblems ✓
- b. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓
- c. Non-polynomial solution problems
- d. Subproblems where resources are shared

Your answer is correct.

The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems

Question 4

Correct

Mark 1.00 out
of 1.00

The difference between Divide and Conquer and Dynamic Programming is:

Select one:

- a. The depth of recurrence
- b. Whether the subproblems overlap or not ✓
- c. The division of problems and combination of subproblems
- d. The way we solve the base case

Your answer is correct.

The correct answer is: Whether the subproblems overlap or not

Question 5

Correct

Mark 1.00 out
of 1.00

Every recurrence can be solved using the Master Theorem

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 6

Correct

Mark 1.00 out
of 1.00

What are 2 things required in order to successfully use the dynamic programming technique?

Select one:

- a. Non-overlapping subproblems and intervals
- b. Optimal substructure and overlapping sub-problems ✓
- c. Divide and conquer
- d. Recursion and a problem that is complex
- e. A problem that can't be subdivided and is complex

Your answer is correct.

The correct answer is: Optimal substructure and overlapping sub-problems



Question 7

Correct

Mark 1.00 out
of 1.00

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:

(Select the correct attribute)

Select one:

- a. Subproblems ✓
- b. Recursion equation
- c. Divide and conquer strategy
- d. Complexity of the algorithm

Your answer is correct.

The correct answer is: Subproblems

Question 8

Correct

Mark 1.00 out
of 1.00

Recurrence equations describing the work done during recursion are only useful for divide and conquer algorithm analysis

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 9

Correct

Mark 1.00 out
of 1.00

Assume we are solving the rod-cutting problem in the book using dynamic programming, and we have a rod of length n that we decide to cut at location

- i. How many subproblems are left after we make this cut
- ii. How many choices do we need to check for each subproblem?

We are trying to find the maximum profit from the rod lengths that we cut.

Select one:

- a. 3 subproblems, n-1 choices to check
- b. 1 subproblem, up to n choices we have to check ✓
- c. 2 subproblems, n choices we have to check
- d. No subproblems, we just solve the problem directly

Your answer is correct.

The correct answer is: 1 subproblem, up to n choices we have to check



Question 10

Correct

Mark 1.00 out
of 1.00

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization:

Dynamic Programming

2. Unweighted shortest simple path in a graph:

Dynamic Programming

3. Quicksort: Divide and Conquer

4. Longest common subsequence:

Dynamic Programming

Your answer is correct.

The correct answer is:

Select the problems with the technique that can best be used to solve them.

1. Matrix chain multiplication parenthesization: [Dynamic Programming]

2. Unweighted shortest simple path in a graph: [Dynamic Programming]

3. Quicksort: [Divide and Conquer]

4. Longest common subsequence: [Dynamic Programming]

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Started on Saturday, 19 December 2020, 11:24 PM

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Completed on Saturday, 19 December 2020, 11:54 PM

Time taken 29 mins 59 secs

Grade 7.67 out of 10.00 (77%)

Question 1

Correct

Mark 1.00 out of 1.00

What is an Algorithm?

Select one:

- a. A way to solve a problem
- b. A step by step method of solving a task
- c. A computer program
- d. A step by step method of solving a computational task



Your answer is correct.

The correct answer is: A step by step method of solving a computational task

Question 2

Incorrect

Mark 0.00 out of 1.00

Which of the following is a computational task?

Select one:

- a. What is 54×566 ?
- b. Given a whole number A, is A prime?
- c. What is $85 - 9 + 4$?
- d. All of the Above ✗

Your answer is incorrect.

The correct answer is: Given a whole number A, is A prime?

Question 3

Partially correct

Mark 0.67 out of 1.00

Standard way of specifying an algorithm is/are

Select one or more:

- a. Pseudo Code ✓
- b. Class Diagram
- c. Flowcharts ✓
- d. Specifying Steps

Your answer is partially correct.

You have correctly selected 2.

The correct answers are: Flowcharts, Pseudo Code, Specifying Steps



Question 4

Correct

Mark 1.00 out
of 1.00

Following pseudocode is used to sort a list using bubble sort.
What is the missing code segment (indicated as <missing>)?

```
BUBBLE-SORT(A)
do
    swapped = false
    for i = 2 to A.length
        if A[i-1] > A[i]
            temp = A[i]
            <missing>
            swapped = true
    while swapped
```

Select one:

- a.
 $A[i] = A[i+1]$
 $A[i-1] = \text{temp}$
- b.
 $A[i] = A[i-1]$
 $A[i+1] = \text{temp}$
- c.
 $A[i-1] = A[i]$
 $i = i+1$
- d.
 $A[i] = A[i-1]$
 $A[i-1] = \text{temp}$ ✓



Your answer is correct.

The correct answer is:

$A[i] = A[i-1]$
 $A[i-1] = \text{temp}$

Question 5

Correct

Mark 1.00 out
of 1.00

Studying Algorithms and Data Structures helps to (Select all that applies)

Select one or more:

- a. Run a computer program
- b. Understand and solve problems ✓
- c. Improve currently existing solution ✓
- d. Solve problems in best way ✓

Your answer is correct.

The correct answers are: Understand and solve problems,
Solve problems in best way, Improve currently existing
solution



Question 6

Incorrect

Mark 0.00 out
of 1.00

What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?

Select one:

- a. 20
- b. 15
- c. 10 ✖
- d. 5

Your answer is incorrect.

The correct answer is: 15

Question 7

Correct

Mark 1.00 out
of 1.00

The operation of arranging a list of integers in the order of increasing value is

Select one:

- a. Searching
- b. Sorting ✓
- c. None of the Above
- d. Traversal

Your answer is correct.

The correct answer is: Sorting

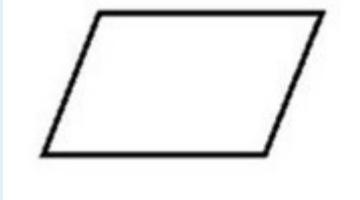
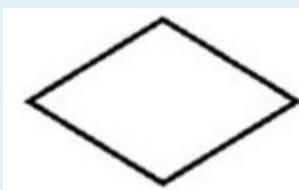
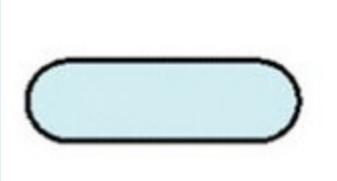
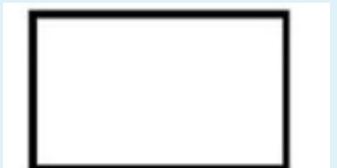
Question 8

Correct

Mark 1.00 out
of 1.00

The flowchart symbol used to denote data is

Select one:

- a. 
- b. 
- c. 
- d. 

Your answer is correct.



The correct answer is:

Question 9

Correct

Mark 1.00 out
of 1.00

The operation of processing each element in the list is known as

Select one:

- a. Sorting
- b. Traversal ✓
- c. Inserting
- d. Merging

Your answer is correct.

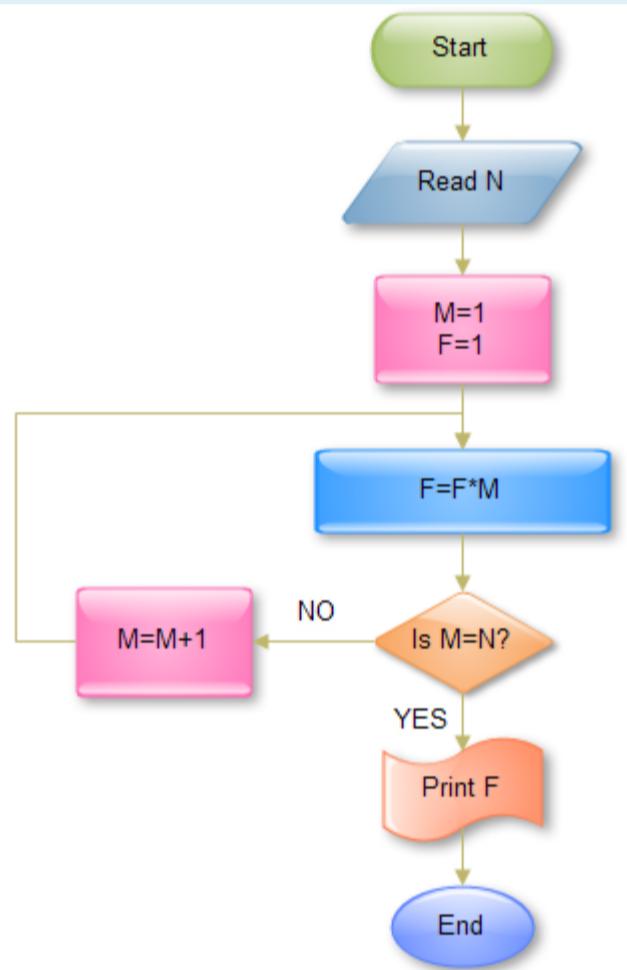
The correct answer is: Traversal

Question 10

Correct

Mark 1.00 out
of 1.00

What is the result (F) when the input (N) = 4?



Select one:

- a. 100
- b. 150
- c. 24 ✓
- d. 50

Your answer is correct.

The correct answer is: 24

PREVIOUS ACTIVITY

◀ Flowchart Examples

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Completed on Sunday, 27 December 2020, 11:59 PM

Time taken 4 mins 45 secs

Grade 5.00 out of 10.00 (50%)

Question 1

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int a = 0;  
for (i = 0; i < N; i++) {  
    for (j = N; j > i; j--) {  
        a = a + i + j;  
    }  
}
```

Select one:

- a. $O(N)$
- b. $O(N^2)$ ✓
- c. $O(N \cdot \text{Sqrt}(N))$
- d. $O(N \cdot \log(N))$

Your answer is correct.

The correct answer is: $O(N^2)$

Question 2

Correct

Mark 1.00 out
of 1.00

Express the function $\frac{n^3}{1000} - 100n^2 - 100n + 3$ in terms of Θ -notation.

Select one:

- a. $\Theta(\sqrt{n})$
- b. $\Theta(n^2)$
- c. $\Theta(n^3)$ ✓
- d. $\Theta(\log(n))$

Your answer is correct.

The correct answer is: $\Theta(n^3)$

Question 3

Incorrect

Mark 0.00 out
of 1.00

Let $f(n) = 7n + 8$ and $g(n) = n$, find c (a suitable constant) such that $O(g(n)) = f(n)$ for $n \geq n_0$

Select one:

- a. 8
- b. There is no such constant ✗
- c. 7

Your answer is incorrect.

The correct answer is: 8

Question 4

Incorrect

Mark 0.00 out
of 1.00

What are the factors that affect the running time of a program?

Select one:

- a. CPU speed ✗
- b. Nature of input data set
- c. Memory
- d. All of the above

Your answer is incorrect.

The correct answer is: All of the above

Question 5

Partially correct

Mark 0.50 out
of 1.00

Select the factors that are considered for analyzing algorithms.

Select one or more:

- a. HDD Space
- b. Amount of Memory available ✗
- c. Amount of work done ✓
- d. Amount of memory used ✓

Your answer is partially correct.

You have selected too many options.

The correct answers are: Amount of work done, Amount of memory used

Question 6

Incorrect

Mark 0.00 out
of 1.00

The worst case complexity of linear search algorithm is

Select one:

- a. $O(n)$
- b. $O(n \log(n))$ ✗
- c. $O(n^2)$
- d. $O(\log n)$

Your answer is incorrect.

The correct answer is: $O(n)$ 

Question 7

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
    for (j = 2; j <= N; j = j * 2) {
        k = k + N / 2;
    }
}
```

Select one:

- a.
 $O(N)$
- b.
 $O(N \log(N))$ ✓
- c. $O(N^N)$
- d. $O(N \sqrt{N})$

Your answer is correct.

The correct answer is:

 $O(N \log(N))$ **Question 8**Partially
correctMark 0.50 out
of 1.00Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?

Select one or more:

- a. $\Omega(n^2)$
- b. $\omega(n^3)$
- c. $o(n^3)$
- d. $O(n^4)$ ✓
- e. $\Theta(n^4)$

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: $O(n^4)$, $\Omega(n^2)$ **Question 9**

Incorrect

Mark 0.00 out
of 1.00

The time factor when determining the efficiency of algorithm is measured by

Select one:

- a. Counting microseconds
- b. Counting the kilobytes of algorithm
- c. Counting the number of statements ✗
- d. Counting the number of key operations

Your answer is incorrect.

The correct answer is: Counting the number of key operations



Question 10

Correct

Mark 1.00 out
of 1.00

For the functions, n^k and c^n , what is the asymptotic relationship between these functions?

Assume that $k \geq 1$ and $c > 1$ are constants

Select one:

- a. n^k is $O(c^n)$ ✓
- b. n^k is $\Theta(c^n)$
- c. n^k is $\Omega(c^n)$

Your answer is correct.

The correct answer is: n^k is $O(c^n)$

PREVIOUS ACTIVITY

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Lecture Slides : Recursion
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Completed on Saturday, 9 January 2021, 10:23 PM

Time taken 25 mins 12 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

The definition of recursive function

Select one:

- a. Function that calls itself directly or indirectly to solve a different version of its task
- b. Function that calls function directly or indirectly to solve a different version of its task
- c. Function that calls function directly or indirectly to solve a smaller version of its task
- d. Function that calls itself directly or indirectly to solve a smaller version of its task ✓

Your answer is correct.

The correct answer is: Function that calls itself directly or indirectly to solve a smaller version of its task

Question 2

Correct

Mark 1.00 out of 1.00

Given the following method declaration, what will `redo(82, 3)` return?

```
public static int redo(int i, int j)
{
    if (i==0)
        return 0;
    else
        return redo(i/j, j)+1;
}
```

Here '/' is integer division.

Select one:

- a. 6
- b. 4
- c. 7
- d. 5 ✓

Your answer is correct.

The correct answer is: 5

Question 3

Correct

Mark 1.00 out
of 1.00**Select true statement(s) considering Iteration vs Recursion****Select one or more:**

- a. Iteration increases the performance of an algorithm ✓
- b. Considering readability and clearness, iteration is better than recursion
- c. Recursion is the best way to solve a problem over iteration
- d. Recursion need more memory than iteration ✓

Your answer is correct.**The correct answers are: Recursion need more memory than iteration, Iteration increases the performance of an algorithm****Question 4**

Correct

Mark 1.00 out
of 1.00**A recursive function without If and Else conditions will always lead to?****Select one:**

- a. Infinite Loop ✓
- b. Correct Results
- c. Finite loop
- d. Incorrect Results

Your answer is correct.**The correct answer is: Infinite Loop****Question 5**

Correct

Mark 1.00 out
of 1.00**Algorithm(s) which use divide and conquer approach****Select one or more:**

- a. Insertion Sort
- b. Selection Sort
- c. Merge sort ✓
- d. Binary search ✓

Your answer is correct.**The correct answers are: Binary search, Merge sort**

Question 6

Correct

Mark 1.00 out
of 1.00

What is the correct output of the following function for x=25

```
void RecurciveFunction(int x)
{
    if (x == 0)
        return;

    printf("%d", x%2);
    fun(x/2);
}
```

Select one:

- a. 11011
- b. 01100
- c. 11111
- d. 10011 ✓

Your answer is correct.

The correct answer is: 10011

Question 7

Correct

Mark 1.00 out
of 1.00Select the incorrect statement(s) about recursion?

Select one or more:

- a. Every recursive function need to have a return value ✓
- b. Infinite recursion can happen if the base case isn't properly declared
- c. A recursive function makes the code easier to understand
- d. Every recursive function need to have a base case

Your answer is correct.

The correct answer is: Every recursive function need to have a return value



Question 8

Correct

Mark 1.00 out
of 1.00**Consider Following Code**

```
void my_recursive_function()
{
    my_recursive_function();
}
```

```
int main()
{
    my_recursive_function();
    return 0;
}
```

What will happen when the above snippet is executed?

Select one:

- a. The code will run for some time and stop when the stack overflows ✓
- b. The code will show a compile time error
- c. The code will be executed successfully and no output will be generated
- d. The code will be executed successfully and random output will be generated

Your answer is correct.

The correct answer is: The code will run for some time and stop when the stack overflows

Question 9

Correct

Mark 1.00 out
of 1.00

Consider a situation where you don't have function to calculate power (pow() function in C) and you need to calculate x^n where x can be any number and n is a positive integer. What can be the best possible time complexity of your power function?

Select one:

- a. $O(\text{Log}n)$
- b. $O(\text{Log}n)$ ✓
- c. $O(n\text{Log}n)$
- d. $O(n)$

Your answer is correct.

Power of a number can be calculated recursively.

Refer <https://www.geeksforgeeks.org/write-a-c-program-to-calculate-powxn/>

The correct answer is: $O(\text{Log}n)$



Question 10

Correct

Mark 1.00 out
of 1.00

Which of the following **recursion** functions can be used to calculate factorial of a number.

Select one:

- a. $\text{fact}(n) = n * \text{fact}(n+1)$
- b. $\text{fact}(n) = n * \text{fact}(n-1)$ ✓
- c. $\text{fact}(n) = n * \text{fact}(1)$
- d. $\text{fact}(n) = n * \text{fact}(n)$

Your answer is correct.

The correct answer is: $\text{fact}(n) = n * \text{fact}(n-1)$

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Started on Saturday, 23 January 2021, 11:08 PM

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Completed on Saturday, 23 January 2021, 11:53 PM

Time taken 45 mins

Marks 14.00/15.00

Grade 9.33 out of 10.00 (93%)

Question 1

Correct

Mark 1.00 out
of 1.00

What is/are the best data structure(s) to implement recursive function calls?

Select one or more:

- a. Binary Tree
- b. Linked List
- c. Stack ✓
- d. Array

Your answer is correct.

The correct answer is: Stack

Question 2

Correct

Mark 1.00 out
of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Verify by induction

Step 2 ↕ ✓

Solve for constants

Step 3 ↕ ✓

Guess the form of the solution

Step 1 ↕ ✓

Your answer is correct.

The correct answer is: Verify by induction → Step 2, Solve for constants → Step 3, Guess the form of the solution → Step 1

Question 3

Correct

Mark 1.00 out
of 1.00

Which is not a method for analyzing time complexity of recurrences?

Select one:

- a. Amortized Method ✓
- b. Master Method
- c. Recurrence Tree Method
- d. Substitution Method

Your answer is correct.

The correct answer is: Amortized Method

Question 4

Correct

Mark 1.00 out
of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

- a. It has a linear time complexity and a linear space complexity.
- b. It has a linear time complexity. ✓
- c. It has a double linear complexity.
- d. It has a double linear time complexity.

Your answer is correct.

The correct answer is: It has a linear time complexity.

Question 5

Correct

Mark 1.00 out
of 1.00

What is the most appropriate base case for a recursive function to calculate the factorial of a number?

$$\text{fac}(n) = n * (n-1) * \dots * 1$$

Note: Factorial of zero is defined to be 1. The above function should be able to satisfy $\text{fac}(0)$ as well.

Select one:

- a. $n \geq 0$
- b. $n \leq 1$ ✓
- c. $n == 1$
- d. $n == 0$

Your answer is correct.

The correct answer is: $n \leq 1$

Question 6

Correct

Mark 1.00 out
of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

- True
- False ✓

False.

Case 3 of the master theorem applies:

$f(n) = O(n^{\log_3(3)}) = O(n)$ for $f(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.



Question 7

Correct

Mark 1.00 out
of 1.00

What is the number of Recursive Calls are made when computing the sum of the list [3,5,4,8,1]?

Select one:

- a. 4 ✓
- b. 6
- c. 3
- d. 5

Your answer is correct.

The correct answer is: 4

Question 8

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 16T(n/4) + n$$

Select one:

- a. $T(n) = \Theta(n^2 \log(n))$
- b. Master Theorem does not apply.
- c. $T(n) = \Theta(n^2)$ ✓
- d. $T(n) = n \log(n)$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2)$

Question 9

Incorrect

Mark 0.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 10T(n/3) + 17n^{1.2}$$

Select one:

- a. $T(n) = \Theta(n^{\log_3(10)})$.
- b. $T(n) = \Theta(\log_2(n))$
- c. $T(n) = \Theta(\lg^2(n))$
- d. $T(n) = \Theta(n^{\log_{10}(5)})$.

✗

The correct answer is: $T(n) = \Theta(n^{\log_3(10)})$.



Question 10

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 2T(n/3) + n\lg n$$

Select one:

- a. $T(n) = \Theta(\lg(n))$
- b. $T(n) = \Theta(n\lg(n))$
- c. $T(n) = \Theta(n^2\lg(n))$
- d. $T(n) = \Theta(n)$

The correct answer is: $T(n) = \Theta(n\lg(n))$

Question 11

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 4T(n/2) + n/\log(n)$$

Select one:

- a. $T(n) = n\log(n)$
- b. Master Theorem does not apply.
- c. $T(n) = \Theta(n^2)$
- d. $T(n) = \Theta(n^2\log(n))$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2)$



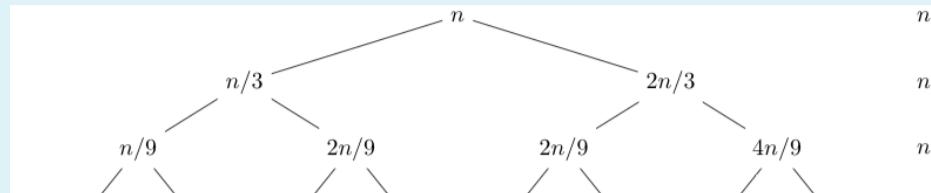
Question 12

Correct

Mark 1.00 out
of 1.00**Recursion** Tree is one way to analyze recursive functions.

Consider a function with following time complexity.

$$T(n) = T(n/3) + T(2n/3) + n$$

Following figure shows the first 3 levels of the **recursion** tree.What is/are the number(s) which can appear in the next (4th) level in this **recursion** tree?

Select one or more:

- a. $n/27$ ✓
- b. $16n/27$
- c. $8n/27$ ✓
- d. $2n/27$ ✓

Your answer is correct.

The correct answers are: $n/27, 2n/27, 8n/27$ **Question 13**

Correct

Mark 1.00 out
of 1.00

Find the solution to following recurrence equation:

$$f(n) = \begin{cases} 1 & \text{if } n=1 \\ 1+f(\lfloor n/2 \rfloor) & \text{if } n \geq 2 \end{cases}$$

Select one:

- a. $f(n) = \lfloor \log(n+1) \rfloor$
- b. $f(n) = \lfloor \log(n) \rfloor + 1$ ✓
- c. $f(n) = n \log(n)$
- d. $f(n) = \log(n)$

The correct answer is: $f(n) = \lfloor \log(n) \rfloor + 1$

Question 14

Correct

Mark 1.00 out
of 1.00

Solve the following Recursive Algorithm:

$$\text{T}(n) = \begin{cases} 2T\left(\frac{n}{2}\right) + \text{prime}(n) & \text{if } n > 1 \\ 1 & \text{if } n = 1 \end{cases}$$

Select one:

- a. $T(n) = O(n^2)$
- b. $T(n) = O(n \log(n))$
- c. $T(n) = O(n)$
- d. $T(n) = O(\log(n))$

Your answer is correct.

The correct answer is: $T(n) = O(n \log(n))$ **Question 15**

Correct

Mark 1.00 out
of 1.00

Given a set 'S' of n integers and another integer x, an algorithm should determine whether or not there exists two elements in S whose sum is exactly x. A possible algorithm for this task is described below.

- 1) Sort the elements in S using any efficient sorting algorithm.
- 2) Remove the last element from S. Let y be the value of the removed element.
- 3) If S is non-empty, look whether an element z exist in S where $z=x-y$
- 4) If S contains such an element z, then stop, since we have found y and z such that $x=y+z$; otherwise repeat Step 2.
- 5) If S is empty, then no two elements in S sum to x.

Select the correct statement(s) regarding above approach.

Select one or more:

- a. Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity. ✓
- b. Best time complexity to do Step 3 is $\Theta(n)$.
- c. Time complexity of this algorithm is $\Theta(n \lg n)$. ✓
- d. There are algorithms which can solve this task with better time complexity than above described algorithm

Your answer is correct.

The correct answers are: Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity., Time complexity of this algorithm is $\Theta(n \lg n)$.



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Marks 12.00/12.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Choose a statement about stacks that is not correct?

Select one:

- a. Linked list are used for implementing stacks
- b. Top of the stack always contains the latest item
- c. Pop and push are the primary operations used in stacks
- d. Stack is a FIFO data structure ✓

The correct answer is: Stack is a FIFO data structure

Question 2

Correct

Mark 1.00 out
of 1.00

Which of the following statement is wrong regarding Python lists and arrays.

Select one:

- a. Both can be indexed and iterated through
- b. Both can be sliced
- c. A Python array with numbers can be divided by a certain number while doing same on python list will result in Type error.
- d. All statements are correct ✓

Your answer is correct.

The correct answer is: All statements are correct

Question 3

Correct

Mark 1.00 out
of 1.00

Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

Select one:

- a. Inverting a node after the node with given location
- b. Searching of an unsorted list for a given item
- c. Deleting a node whose location is given ✓
- d. Traversing a list to process each node

Your answer is correct.

The correct answer is: Deleting a node whose location is given

Question 4

Correct

Mark 1.00 out
of 1.00

Which of the following statement(s) is/are correct regarding dictionary data structure.

Select one or more:

- a. Dictionaries are often implemented as hash tables. ✓
- b. In a dictionary, if the value of a key is null, then search operation on that dictionary will return that key as non-existent.
- c. A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value. ✓
- d. Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements. ✓

Your answer is correct.

The correct answers are: A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value., Dictionaries are often implemented as hash tables., Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements.

Question 5

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding arrays and list

Select one or more:

- a. One advantage of the array compared to list is the ability to perform random access without additional data structures. ✓
- b. In a List, elements are spread about in memory, but linked together. ✓
- c. Insertion is easier in the array compared to list.
- d. Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array. ✓

Your answer is correct.

The correct answers are: Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array., One advantage of the array compared to list is the ability to perform random access without additional data structures., In a List, elements are spread about in memory, but linked together.



Question 6

Correct

Mark 1.00 out
of 1.00

Consider the following operation performed on a stack of size 5.

```
Push(1);  
Pop();  
Push(2);  
Push(3);  
Pop();  
Push(4);  
Pop();  
Pop();  
Push(5);
```

After the completion of all operation, the number of elements present in stack are

Select one:

- a. 3
- b. 4
- c. 1 ✓ Number of elements present in stack is equal to the difference between number of push operations and number of pop operations. Number of elements is $5-4=1$.
- d. 2

Your answer is correct.

The correct answer is: 1

Question 7

Correct

Mark 1.00 out
of 1.00

How many comparisons needed to search a singly linked list of length n for a given element in the worst case,

Select one:

- a. $\log_2 n - 1$
- b. $2n$
- c. n ✓
- d. $n/2$

The correct answer is: n

Question 8

Correct

Mark 1.00 out
of 1.00

Choose the output of the following code segment on python list :

```
A=[1,2,3,4,5,6,7,8,9]  
A[::2]=10,20,30,40,50,60  
Print(A)
```

Select one:

- a. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓
- b. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]
- c. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
- d. [1, 2, 10, 20, 30, 40, 50, 60]

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5



Question 9

Correct

Mark 1.00 out
of 1.00

Consider the following postfix notations and find out the answer using stack operations:

8, 14, 6, +, *, 8, 40, 20, /, +, * is?

Select one:

- a. 160
- b. 16000
- c. 1600 ✓
- d. 16

The correct answer is: 1600

Question 10

Correct

Mark 1.00 out
of 1.00

Choose the key advantage of a circular queue:

Select one:

- a. Effective usage of processor
- b. Fast access
- c. None of the mentioned
- d. Effective usage of memory ✓

The correct answer is: Effective usage of memory

Question 11

Correct

Mark 1.00 out
of 1.00

Which one of the following is a queue

Select one:

- a. Array
- b. LIFO list
- c. FIFO list ✓
- d. Multi dimensional array

The correct answer is: FIFO list

Question 12

Correct

Mark 1.00 out
of 1.00

Which of the following is not a data structure

Select one:

- a. Variable ✓
- b. Record
- c. Array
- d. Dictionary

The correct answer is: Variable



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Started on Monday, 15 February 2021, 11:16 PM

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Completed on Monday, 15 February 2021, 11:46 PM

Time taken 30 mins 1 sec

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Select whether the following statement is True/False.

Binary Search is appropriate for linked lists

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 2

Correct

Mark 1.00 out of 1.00

For a set of numbers {1,2,3,4} ,How many different unique binary search trees can be drawn?

Answer: 14 ✓

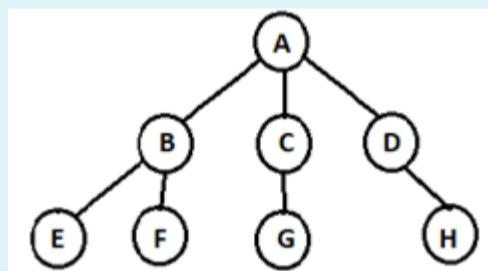
The correct answer is: 14

Question 3

Correct

Mark 1.00 out of 1.00

What is(are) the leaf node(s) in the following K-ary Tree



Select one or more:

- a. F ✓
- b. A
- c. B
- d. G ✓

Your answer is correct.

The correct answers are: F, G

Question 4

Correct

Mark 1.00 out
of 1.00

What is the largest number of nodes BST can have with depth of 3

Answer: 15



The correct answer is: 15

Question 5

Correct

Mark 1.00 out
of 1.00

What is the number of internal nodes of a complete k-ary tree?

Select one:

- a. $(k^h - 1)/(k - 1)$
- b. $k^{(h-1)}$
- c. $(k^h - 1)/k$
- d. $(h^k - 1)/(h - 1)$

Your answer is correct.

The correct answer is: $(k^h - 1)/(k - 1)$



Question 6

Correct

Mark 1.00 out
of 1.00***BINARY_SEARCH(List, Key)****if length of the List is 0* *else if the middle element is equal to Key* *else if the Key is less than the middle element* *Else*

Your answer is correct.

The correct answer is:

BINARY_SEARCH(List, Key)*if length of the List is 0***[Return false]***else if the middle element is equal to Key***[return true/ return index]***else if the Key is less than the middle element***[BINARY_SEARCH(First Half of the List, Key)]***Else***[BINARY_SEARCH(Second Half of List, Key)]****Question 7**

Correct

Mark 1.00 out
of 1.00

Which of the following binary trees are BSTs?

(1)	(2)	(3)	(4)
A	10	cat	15
/ \	/	/ \	/ \
B C	5	bat rat	5 22
		/	\ \
	-3	ant	20 30

Select one:

- a. 2,3
- b. None of these
- c. 2,4
- d. 1,4

Your answer is correct.

The correct answer is: 2,3



**Question 8**

Correct

Mark 1.00 out
of 1.00**What is the branching factor of Binary Search Tree?**

Select one:

- a. 3
- b. 2 ✓
- c. 4
- d. 1

The correct answer is: 2

Question 9

Correct

Mark 1.00 out
of 1.00**By which Factor does the Binary Search Narrows the Search?**

Select one:

- a. Four (4) times at each iteration
- b. Does not narrow the search by any factor
- c. Two (2) times at each iteration ✓
- d. Two (2) times at each search operation

The correct answer is: Two (2) times at each iteration

Question 10

Correct

Mark 1.00 out
of 1.00**Which of the following tree traversal algorithm print out all the keys in a binary search tree in sorted order?**

Select one:

- a. In-order traversal ✓
- b. Pre-order traversal
- c. It depends on whether the binary tree is height-balanced or not.
- d. Post-order traversal

Your answer is correct.

The correct answer is: In-order traversal

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Started on Saturday, 20 February 2021, 11:27 PM

State Finished

Completed on Saturday, 20 February 2021, 11:57 PM

Time taken 30 mins 2 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out of 1.00

Heap Data Structure is an Array Object that can be Viewed as a

Complete Binary Tree ✓

Your answer is correct.

Heap Data Structure is an Array Object that can be Viewed as a
[[1]]

The correct answer is:

Heap Data Structure is an Array Object that can be Viewed as a
[Complete Binary Tree]

Question 2

Incorrect

Mark 0.00 out of 1.00

BUILD-MIN-HEAP(A)

```
A.heapsize = A.length
for i = A.length/2 down to 1
    MIN-HEAPIFY(A,i)
```

Running time for the "MIN-HEAPIFY" operation is $O(\log n)$. What is the time complexity of "BUILD-MIN-HEAP" operation.

Select one:

- a. $O(\log n^2)$
- b. $O(n)$
- c. $O(n^2 \log n)$
- d. $O(n \log n)$ ✗

Your answer is incorrect.

<https://www.growingwiththeweb.com/data-structures/binary-heap/build-heap-proof/>

The correct answer is: $O(n)$



Question 3

Correct

Mark 1.00 out
of 1.00

Heap property for max-heap is x . Parent $\leq x$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 4

Correct

Mark 1.00 out
of 1.00

Which of the following is the recurrence relation for Heapify Operation?

Select one:

- a. $T(n) \leq T(n/2) + \Theta(1)$
- b. $T(n) \leq T(3n/2) + \Theta(1)$
- c. $T(n) \leq T(2n/3) + \Theta(1)$ ✓
- d. $T(n) \leq T(2n/3) + \Theta(n)$

The correct answer is: $T(n) \leq T(2n/3) + \Theta(1)$

Question 5

Correct

Mark 1.00 out
of 1.00

Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28

How many heapify operations have been performed on root of heap?

Select one:

- a. 3 or 4
- b. 5 or 6
- c. 2 ✓
- d. 1

Your answer is correct.

The correct answer is: 2

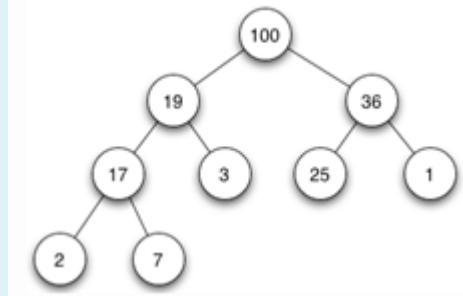


Question 6

Correct

Mark 1.00 out
of 1.00

If we implement heap as Max-Heap, adding a new node of value 15 to the leftmost node of the right sub tree. What value will be at leaf nodes of the right sub tree of the heap?



Select one:

- a. 2 and 3
- b. 15 and 1 ✓
- c. 25 and 1
- d. 3 and 1

The correct answer is: 15 and 1

Question 7

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of BUILDHEAP operation?

Select one:

- a. $O(\log(n))$
- b. $O(n^2)$
- c. $O(n)$ ✓
- d. $O(n \log(n))$

The correct answer is: $O(n)$

Question 8

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of HeapIncreaseKey operation?

Select one:

- a. $O(n^2)$
- b. $O(n \log(n))$
- c. $O(\log(n))$ ✓
- d. $O(n)$

The correct answer is: $O(\log(n))$



Question 9

Correct

Mark 1.00 out
of 1.00

What is the typical running time of a heap sort algorithm?

Select one:

- a. $O(N^2)$
- b. $O(N \log N)$ ✓ The total running time of a heap sort algorithm is mathematically found to be $O(N \log N)$.
- c. $O(N)$
- d. $O(\log N)$

Your answer is correct.

The correct answer is: $O(N \log N)$ **Question 10**

Correct

Mark 1.00 out
of 1.00Which of the following is not a standard in-place sorting algorithm?

Select one:

- a. Merge sort ✓
- b. Quick sort
- c. Heap sort
- d. Selection sort

The correct answer is: Merge sort

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Started on Saturday, 6 March 2021, 9:03 PM

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Completed on Saturday, 6 March 2021, 9:30 PM

Time taken 26 mins 29 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Suppose we have an empty **Hash Table**, where $H(k) = k \% M$ and $M = 7$. After inserting the keys 31, 77, and 708 into our **Hash Table** (in that order), which index will the key 49 end up hashing to using the collision resolution strategy of **Linear Probing**?

Answer: 2



Collision occurs at index 0, since index 1 is already occupied(708), the answer is 2

The correct answer is: 2

Question 2

Correct

Mark 1.00 out of 1.00

When several elements are competing for the same bucket in the hash table, it is called?

Select one:

- a. Replication
- b. Chaining
- c. None of the mentioned
- d. Collision

The correct answer is: Collision

Question 3

Correct

Mark 1.00 out of 1.00

A hash function is

Select one:

- a. A function that computes the location of the key in the array
- b. A function that creates an array
- c. A function with allocated memory to keys
- d. None of the mentioned

The correct answer is: A function that computes the location of the key in the array



Question 4

Correct

Mark 1.00 out
of 1.00**What is the load factor?****Select one:**

- a. Average key size
- b. Average array size
- c. Average hash table length
- d. Average chain length ✓ In simple chaining, load factor is the average number of elements stored in a chain, and is given by the ratio

Your answer is correct.**The correct answer is: Average chain length****Question 5**

Correct

Mark 1.00 out
of 1.00**Hash table is?****Select one:**

- a. A structure used to implement stack and queue
- b. A structure that maps keys to values ✓
- c. A structure that maps values to keys
- d. A structure used for storage

The correct answer is: A structure that maps keys to values

Question 6

Correct

Mark 1.00 out
of 1.00

The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?

Select one:

0	
1	
2	12
3	13
4	
5	5
6	
7	
8	18
9	

 a.

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

 b. c.

0	
1	
2	2
3	23
4	
5	15
6	
7	
8	18
9	

 d.

0	
1	
2	12, 2
3	13, 3, 23
4	
5	5, 15
6	
7	
8	18
9	

Your answer is correct.



The correct answer is:

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

Question 7

Correct

Mark 1.00 out
of 1.00

Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, select the resulting tables after inserting the values in the given order with chaining

Select one:

- a. 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234] ✓
- b. 0 [430] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- c. 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]
- d. 0 [3920] 1 [430] 2 [22] 3 [2341] 4 [2839] 5 [397] 6 [4234]

The correct answer is: 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234]

Question 8

Correct

Mark 1.00 out
of 1.00

Which one of the following hash functions on integers will distribute keys most uniformly over 10 buckets numbered 0 to 9 for i ranging from 0 to 20?

Select one:

- a. $h(i) = i^3 \bmod 10$ ✓
- b. $h(i) = (11 * i^2) \bmod 10$
- c. $h(i) = i^2 \bmod 10$
- d. $h(i) = (12 * i) \bmod 10$

The correct answer is: $h(i) = i^3 \bmod 10$

Question 9

Correct

Mark 1.00 out
of 1.00

Possible hash function to store string in hash table is the string's length, $h(x) = x.length$. This a good hash function.

Select one:

- a. True
- b. False ✓

Strings with the same length will have the same hash code. If we insert lots of strings with the same length, lookup will take $O(n)$ time instead of $O(1)$

The correct answer is 'False'.



Question 10

Correct

Mark 1.00 out
of 1.00

Consider a hash table with 50 slots which use chaining as a collision avoidance mechanism. And assume simple uniform hashing. What is the probability that the first 3 slots are unfilled after the first 3 insertions?

Hint - Check Uniform Hashing

Select one:

a. $\frac{47 \times 47 \times 47}{3! \times 50}$

b. $\frac{49 \times 49 \times 49}{50 \times 50 \times 50}$

c. $\frac{49 \times 48 \times 47}{50 \times 50 \times 50}$

d. $\frac{47 \times 47 \times 47}{50 \times 50 \times 50}$



The correct answer is: $\frac{47 \times 47 \times 47}{50 \times 50 \times 50}$

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HashTables

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Completed on Wednesday, 24 March 2021, 5:17 PM

Time taken 19 mins 5 secs

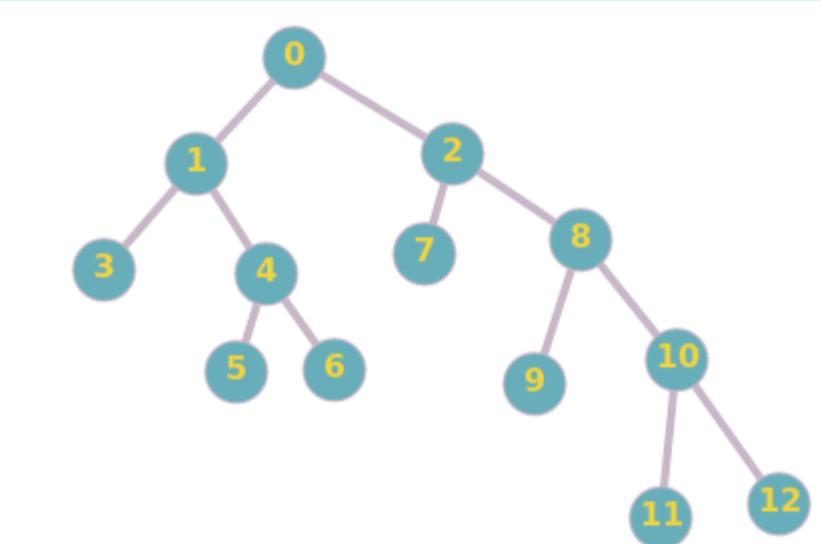
Grade 8.00 out of 10.00 (80%)

Question 1

Incorrect

Mark 0.00 out
of 1.00

Find the output of Depth-First search of the following tree using Post-order traversal:



Select one:

- a. 0 1 2 3 4 7 8 5 6 9 10 11 12
- b. 3 5 6 4 1 7 9 11 12 10 8 2 0
- c. 0 1 3 4 5 6 2 7 8 9 10 11 12 ✗
- d. 3 1 5 4 6 0 7 2 9 8 11 10 12

Your answer is incorrect.

The correct answer is: 3 5 6 4 1 7 9 11 12 10 8 2 0

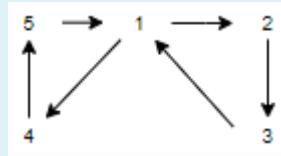


Question 2

Correct

Mark 1.00 out
of 1.00

Which of the following is a possible result of depth first traversal of the given graph (consider 1 to be source element)?



Select one:

- a. 1 2 3 4 5 ✓
- b. 1 2 3 1 4 5
- c. 1 4 5 3 2
- d. 1 4 5 1 2 3

Your answer is correct.

<https://www.sanfoundry.com/data-structure-questions-answers-non-recursive-depth-first-search/>

As 1 is the source element so it will be considered first. Then we start exploring the vertices which are connected to 1. So there will be two possible results - 1 2 3 4 5 and 1 4 5 2 3.

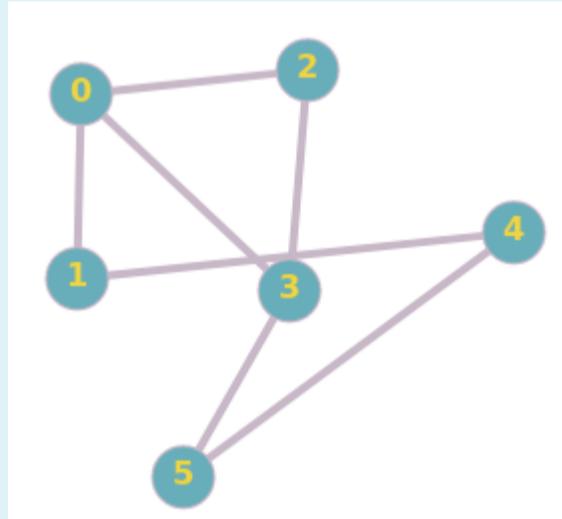
The correct answer is: 1 2 3 4 5

Question 3

Correct

Mark 1.00 out
of 1.00

Find a output of Breadth-First Traversal of the following graph starting from 0 node:



Select one:

- a. 1 0 2 4 3 5
- b. 0 1 4 5 3 2
- c. 0 1 4 5 3 2 0
- d. 0 1 2 3 4 5 ✓

Your answer is correct.

The correct answer is: 0 1 2 3 4 5



Question 4

Correct

Mark 1.00 out
of 1.00

Time Complexity of Breadth First Search is:

Select one:

- a. $O(V + E)$ ✓
- b. $O(\log(V + E))$
- c. $O(V / E)$
- d. $O(V * E)$

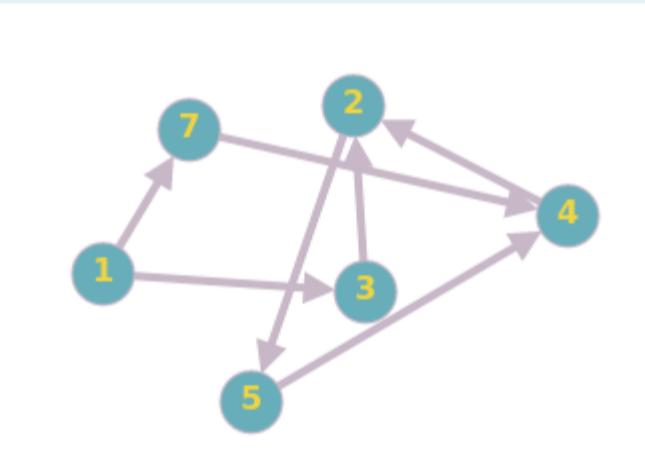
Your answer is correct.

The correct answer is: $O(V + E)$ **Question 5**

Correct

Mark 1.00 out
of 1.00

Find an output of a Breadth-First Traversal of the following graph starting from Node 1:



Select one:

- a. 173425
- b. 132547
- c. 137425
- d. 137245 ✓

Your answer is correct.

The correct answer is: 137245

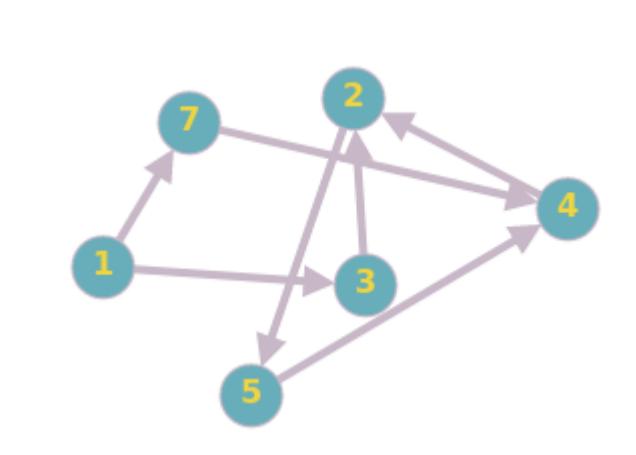


Question 6

Correct

Mark 1.00 out
of 1.00

Find an output of Depth-First traversal of the following graph starting from node 1:



Select one:

- a. 1 7 3 4 2 5
- b. 1 3 2 5 4 7 ✓
- c. 1 3 7 4 2 5
- d. 1 3 7 2 4 5

Your answer is correct.

The correct answer is: 1 3 2 5 4 7

Question 7

Correct

Mark 1.00 out
of 1.00

Which of the following is/are the application(s) of Depth First Search

Select one or more:

- a. Detecting the existence of cycles in a graph. ✓
- b. Solving puzzles with only one solution like mazes ✓
- c. To find friends and friends of friend of a person in social networks like Facebook
- d. Finding all neighbor nodes in Peer to Peer Networks like BitTorrent.

Your answer is correct.

The correct answers are: Solving puzzles with only one solution like mazes, Detecting the existence of cycles in a graph.

Question 8

Correct

Mark 1.00 out
of 1.00

Traversal of a graph is different than tree because.

Select one:

- a. There can be a loop in the graph ✓
- b. DFS on a graph uses stack, while inorder traversal is recursive
- c. Both (a) and (b)
- d. None of the above

Your answer is correct.

The correct answer is: There can be a loop in the graph



Question 9

Correct

Mark 1.00 out
of 1.00

Regarding implementation of Breadth First Search using queues, at a given time, what is the maximum difference between depth of any two nodes present in the queue?

Select one:

- a. Atmost 1 ✓
- b. 0
- c. Insufficient Information
- d. Can be anything

Your answer is correct.

The correct answer is: Atmost 1



Question 10

Incorrect

Mark 0.00 out
of 1.00

Pseudo codes for Breadth First Search(BFS) and Depth First Search(DFS) which look alike except one line is given below. Select the correct pseudo code segments for STATEMENT 1 and STATEMENT 2.

BFS(G)

```
{
list L = empty
tree T = empty
choose a starting vertex x
search(x)
while(L nonempty)
    STATEMENT 1
    if w not yet visited
    {
        add (v,w) to T
        search(w)
    }
}

DFS(G)
{
list L = empty
tree T = empty
choose a starting vertex x
search(x)
while(L nonempty)
    STATEMENT 2
    if w not yet visited
    {
        add (v,w) to T
        search(w)
    }
}

search(vertex v)
{
visit(v);
for each edge (v,w)
    add edge (v,w) to end of L
}
```

STATEMENT 1

add edge (v,w) from start of L

**STATEMENT 2**

add edge (v,w) from end of L



Your answer is incorrect.

<https://www.ics.uci.edu/~eppstein/161/960215.html>

Both of these search algorithms keep a list of edges to explore; the only difference between the two is that, while both algorithms adds items to the end of L, BFS removes them from the beginning, which results in maintaining the list as a queue, while DFS removes them from the end, maintaining the list as a stack.

The correct answer is: STATEMENT 1 → remove edge (v,w) from start of L, STATEMENT 2 → remove edge (v,w) from end of L

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Zeetings: Graphs
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Started on Saturday, 27 March 2021, 11:20 PM

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Completed on Saturday, 27 March 2021, 11:50 PM

Time taken 30 mins

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Select the correct answers regarding statement A and statement B

- A) A directed graph is acyclic if DFS yields no back edges
B) DFS yields no back edges if a directed graph is acyclic

Select one:

- a. Both statements are false
- b. Both Statements are true ✓
- c. Only statement A is true
- d. Only statement B is true

Your answer is correct.

The correct answer is: Both Statements are true

Question 2

Correct

Mark 1.00 out of 1.00

A spanning tree for an undirected graph G is

Select one or more:

- a. A connected graph ✓
- b. Has no cycles ✓
- c. Contains all the edges of G ,
- d. An undirected graph ✓

Your answer is correct.

The correct answers are: An undirected graph, Has no cycles, A connected graph

Question 3

Correct

Mark 1.00 out
of 1.00

Select the correct algorithms for computing Minimum Spanning Trees

A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph.

Kruskal's Algorithm



A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it

Prim's Algorithm



Your answer is correct.

The correct answer is: A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph.
→ Kruskal's Algorithm, A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it → Prim's Algorithm

Question 4

Correct

Mark 1.00 out
of 1.00

Consider the following statements regarding Spanning Trees and Minimum Spanning Trees

- A) A spanning tree with N vertices will always have $N-1$ edges.
B) A Minimum spanning tree with N vertices will always have $N-1$ edges.

Select one:

- a. Both A and B are false
- b. Both A and B are true ✓
- c. Only B is true
- d. Only A is true

Your answer is correct.

The correct answer is: Both A and B are true

Question 5

Correct

Mark 1.00 out
of 1.00

Consider a weighted complete graph G on the vertex set V_1, V_2, \dots, V_n such that the weight of the edge (V_i, V_j) is $2|i - j|$. The weight of a minimum spanning tree of G is:

Select one:

- a. $n - 1$
- b. $2n - 2$ ✓
- c. ${}^n C_2$
- d. n^2

The correct answer is: $2n - 2$



Question 6

Correct

Mark 1.00 out
of 1.00

Single-source shortest-path algorithm, such as Breadth First Search algorithms can be used to find a spanning tree for a undirected graph

Select one:

- True ✓
- False

The correct answer is 'True'.

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. W_{ij} entry in the matrix W below is the weight of the edge {i, j}.

In the graph given, what is the minimum possible weight of a path P from vertex 1 to vertex 2 in this graph such that P contains at most 3 edges?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 7
- b. 9
- c. 8 ✓
- d. 10

The correct answer is: 8

Question 8

Correct

Mark 1.00 out
of 1.00

A **maximum spanning tree** is a spanning tree with weight greater than or equal to the weight of every other spanning tree. A student claims that such a tree can be found with algorithms such as Prim's or Kruskal's after multiplying the edge weights by -1 and solving the MST problem on the new graph. His/Her claim is

Select one:

- True ✓
- False

The correct answer is 'True'.

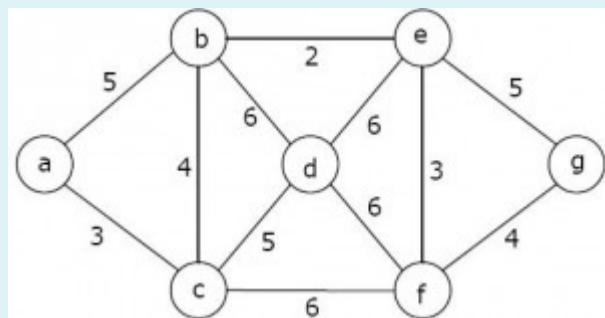


Question 9

Correct

Mark 1.00 out
of 1.00

Which one of the following is NOT the sequence of edges added to the minimum spanning tree of the graph in the figure using Kruskal's algorithm?



Select one:

- a. (b,e)(a,c)(e,f)(b,c)(f,g)(c,d)
- b. (b,e)(e,f)(a,c)(b,c)(f,g)(c,d)
- c. (b,e)(e,f)(a,c)(f,g)(b,c)(c,d)
- d. (b,e)(e,f)(b,c)(a,c)(f,g)(c,d) ✓

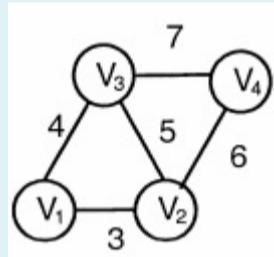
The correct answer is: (b,e)(e,f)(b,c)(a,c)(f,g)(c,d)

Question 10

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What is the length of the path from V_5 to V_6 in the MST of the above graph with $n = 10$?

Select one:

- a. 11
- b. 25
- c. 31 ✓
- d. 41

The correct answer is: 31

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Trees

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Lecture Slides: Single-
Source Shortest Path ►

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Started on Wednesday, 7 April 2021, 9:02 PM

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Completed on Wednesday, 7 April 2021, 9:32 PM

Time taken 30 mins 1 sec

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Which strategy does Djikstra's Algorithm follow?

Select one:

- a. Exhaustive Search
- b. Greedy ✓
- c. Binary Search
- d. Dynamic Programming

The correct answer is: Greedy

Question 2

Correct

Mark 1.00 out of 1.00

What is the time complexity of Dijkstra's shortest path algorithm?

Select one:

- a. $O(|V|)$
- b. $O(|E| \log |V|)$ ✓
- c. $O(|E| |V|)$
- d. $O(|V|^2)$

Your answer is correct.

The correct answers are: $O(|E| \log |V|)$, $O(|V|^2)$

Question 3

Correct

Mark 1.00 out of 1.00

What is the worst case space complexity of Bellman Ford algorithm?

Select one:

- a. $O(|E|)$
- b. $O(|V|^2)$
- c. $O(|E| |V|)$
- d. $O(|V|)$ ✓

The correct answer is: $O(|V|)$

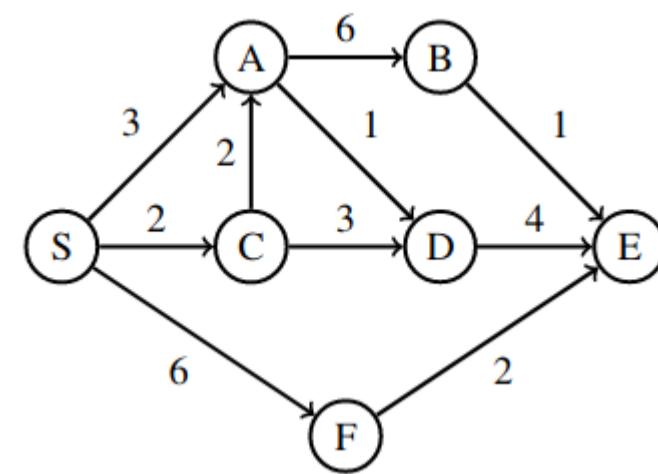


Question 4

Correct

Mark 1.00 out
of 1.00

Run Dijkstra's algorithm on the following directed graph, starting at vertex S. What is the order in which vertices get removed from the priority queue?



Select one:

- a. B, A, C, F, D, E, S
- b. F, S, A, C, D, E, B
- c. S, A, C, F, D, E, B
- d. S, C, A, D, F, E, B ✓

Your answer is correct.

The correct answer is: S, C, A, D, F, E, B

Question 5

Correct

Mark 1.00 out
of 1.00

For what cases can we apply Bellmann Ford algorithm?

Select one or more:

- a. All directed graphs
- b. Undirected and weighted graphs
- c. Directed and weighted graphs ✓
- d. Undirected and unweighted graphs

Your answer is correct.

The correct answer is: Directed and weighted graphs

Question 6

Correct

Mark 1.00 out
of 1.00

If all edges have the same weight in an undirected graph, which algorithm will find the shortest path between two nodes more efficiently?

Select one:

- a. Bellman-Ford
- b. Depth-First Search
- c. Dijkstra
- d. Breadth-First Search ✓

Breadth-First Search has time complexity $O(|V| + |E|)$.

The correct answer is: Breadth-First Search

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a weighted directed graph $G = (V, E, w)$ and let X be a shortest s-t path for $s, t \in V$. If we double the weight of every edge in the graph, setting $w'(e) = 2w(e)$ for each $e \in E$, then X will still be a shortest s - t path in (V, E, w') .

Select one:

- True ✓
- False

Any linear transformation of all weights maintains all relative path lengths, and thus shortest paths will continue to be shortest paths, and more generally all paths will have the same relative ordering. One simple way of thinking about this is unit conversions between kilometers and miles.

The correct answer is 'True'.

Question 8

Correct

Mark 1.00 out
of 1.00

To implement Dijkstra's shortest path algorithm on unweighted graphs so that it runs in linear time, the data structure to be used is:?

Select one:

- a. Stack
- b. Heap
- c. Binary Tree
- d. Queue ✓

If we use Queue (FIFO) instead of Priority Queue (Min Heap), we get the shortest path in linear time $O(|V| + |E|)$.

The correct answer is: Queue

Question 9

Correct

Mark 1.00 out
of 1.00

Given a graph $G = (V, E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.

Select one:

- True ✓
- False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.

The correct answer is 'True'.



Question 10

Correct

Mark 1.00 out
of 1.00

A graph can have a negative weight cycle when?

Select one:

- a. The graph has 1 negative weighted edge
- b. The graph has 1 or more negative weighted edges
- c. The total weight of the graph is negative ✓
- d. The graph has a cycle

Your answer is correct.

When the total weight of the graph sums up to a negative number then the graph is said to have a negative weight cycle. Bellmann Ford Algorithm provides no solution for such graphs.

The correct answer is: The total weight of the graph is negative

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Time taken 11 mins 54 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Dynamic Programming is often used for (choose all that apply)

Select one or more:

- a. Subproblems where resources are shared
- b. Problems previously solved using divide and conquer that have overlapping subproblems ✓
- c. Non-polynomial solution problems
- d. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓

Your answer is correct.

The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems

Question 2

Correct

Mark 1.00 out of 1.00

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:

(Select the correct attribute)

Select one:

- a. Recursion equation
- b. Subproblems ✓
- c. Complexity of the algorithm
- d. Divide and conquer strategy

Your answer is correct.

The correct answer is: Subproblems



Question 3

Correct

Mark 1.00 out
of 1.00

The difference between Divide and Conquer and Dynamic Programming is:

Select one:

- a. The division of problems and combination of subproblems
- b. The way we solve the base case
- c. Whether the subproblems overlap or not ✓
- d. The depth of recurrence

Your answer is correct.

The correct answer is: Whether the subproblems overlap or not

Question 4

Correct

Mark 1.00 out
of 1.00

Every recurrence can be solved using the Master Theorem

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 5

Correct

Mark 1.00 out
of 1.00

A divide and conquer approach to solving a problem is useful when

Select one:

- a. The subproblems are overlapping so we don't have to solve them over and over again
- b. None of the above
- c. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓
- d. The complexity is exponential to solve the entire problem

Your answer is correct.

The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size

Question 6

Correct

Mark 1.00 out
of 1.00

Dynamic programming does not work if the subproblems:

Select one:

- a. Share resources and thus are not independent ✓
- b. Cannot be divided in half
- c. Have to be divided too many times to fit into memory
- d. Overlap

Your answer is correct.

The correct answer is: Share resources and thus are not independent



Question 7

Correct

Mark 1.00 out
of 1.00

Recurrence equations describing the work done during recursion are only useful for divide and conquer algorithm analysis

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 8

Correct

Mark 1.00 out
of 1.00

What are 2 things required in order to successfully use the dynamic programming technique?

Select one:

- a. Recursion and a problem that is complex
- b. Divide and conquer
- c. Optimal substructure and overlapping sub-problems ✓
- d. Non-overlapping subproblems and intervals
- e. A problem that can't be subdivided and is complex

Your answer is correct.

The correct answer is: Optimal substructure and overlapping sub-problems

Question 9

Correct

Mark 1.00 out
of 1.00

The matrix-chain multiply problem for a chain of matrix multiplications $A_1 \dots A_n$ in the book is an example of a dynamic programming problem. Consider the subchain $A_i A_{i+1} \dots A_j$. The problem is to minimize the cost of the multiplication (in terms of the number of required scalar multiplications) by choosing where to parenthesize the chain. In this case choosing where to split the chain and parenthesize it results in how many subproblems and how many choices for each subproblem?

Select one:

- a. 1 subproblem, j choices
- b. 2 subproblems, $n - i$ choices for each
- c. 1 subproblem, $n - j$ choices
- d. 2 subproblems, and $j - i$ choices for each ✓

Your answer is correct.

The correct answer is: 2 subproblems, and $j - i$ choices for each



Question 10

Correct

Mark 1.00 out
of 1.00

Select the problems with the technique that can best be used to solve them.

1. Matrix multiplication: Divide and Conquer ✓
2. Rod cutting: Dynamic Programming ✓
3. Quicksort: Divide and Conquer ✓
4. Interval scheduling: Greedy Strategy ✓

Your answer is correct.

The correct answer is:

Select the problems with the technique that can best be used to solve them.

1. Matrix multiplication: [Divide and Conquer]
2. Rod cutting: [Dynamic Programming]
3. Quicksort: [Divide and Conquer]
4. Interval scheduling: [Greedy Strategy]

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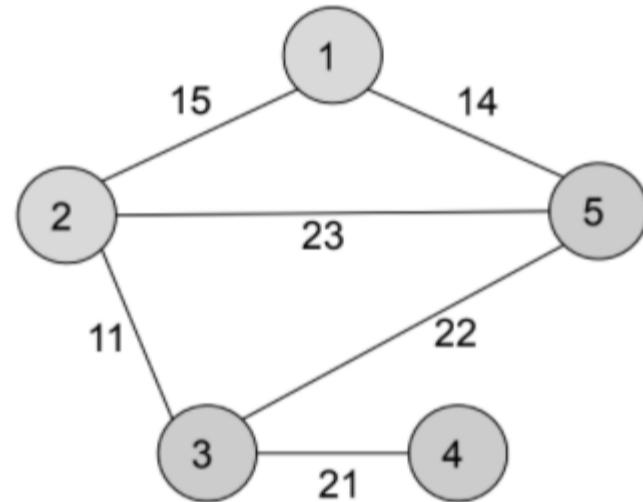
Grade 5.25 out of 10.00 (53%)

Question 1

Incorrect

Mark 0.00 out
of 1.00

Consider the following graph.



Which one of the following set edges forms the minimum spanning tree generated using Prim's algorithm starting at node 4?

Select one:

- a. (4-3)(3-5)(5-1)(1-2)
- b. (4-3)(3-2)(2-1)(1-5)
- c. (4-3)(5-3)(2-3)(1-2)
- d. (4-3)(3-5)(5-2)(1-5) ✗

Your answer is incorrect.

The correct answer is: (4-3)(3-2)(2-1)(1-5)



Question 2

Correct

Mark 1.00 out
of 1.00

You are required to sort an array even in the worst-case in $O(N \log N)$ time. But you are allowed to use only a few local variables. Apart from them, you cannot use any extra space. In this scenario what is the best sorting algorithm?

**Question 3**Partially
correctMark 0.50 out
of 1.00

In which scenario using dynamic programming makes sense ?

Select one or more:

- a. It's faster than Greedy
- b. We need an optimal solution ✗
- c. The solution has optimal substructure ✓
- d. Problem has overlapping subproblems

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: The solution has optimal substructure,
Problem has overlapping subproblems

Question 4

Correct

Mark 1.00 out
of 1.00

Under what case of Master's theorem will the recurrence relation of binary search fall?

Select one:

- a. Case 1
- b. It cannot be solved using master's theorem
- c. Case 3
- d. Case 2 ✓

Your answer is correct.

The correct answer is: Case 2

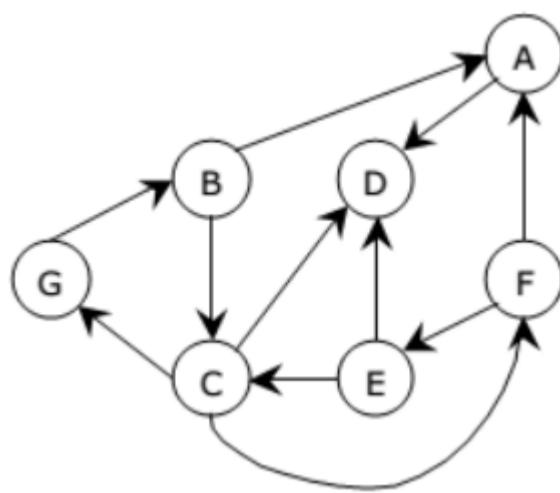


Question 5

Correct

Mark 1.00 out
of 1.00

For the given graph, the order in which the nodes are visited in the breadth-first search starting at node B is :



Node	Adjacency List
A	D
B	A C
C	G D F
D	----
E	C D
F	E A
G	B

Select one:

- a. BADCGFE
- b. BCDFEAG
- c. BACDGFE ✓
- d. Cannot be generated

Your answer is correct.

The correct answer is: BACDGFE

Question 6

Incorrect

Mark 0.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 16T(n/4) - n$$

Select one:

- a. $T(n) = n \log(n)$
- b. Master Theorem does not apply.
- c. $T(n) = \Theta(n^2 \log(n))$
- d. $T(n) = \Theta(n^2)$ ✗

Your answer is incorrect.

The correct answer is: Master Theorem does not apply.



Question 7

Correct

Mark 1.00 out
of 1.00

Consider an undirected graph G with vertices A, B, C, D, and E. In graph G , every edge has a distinct weight. Edge CD is the edge with minimum weight and edge AB is the edge with maximum weight.

Which one of the following is false?

Select one:

- a. G has a unique minimum spanning tree
- b. Every minimum spanning tree of G must contain CD
- c. If AB is in a minimum spanning tree, then its removal must disconnect G
- d. No minimum spanning tree contains AB ✓

Your answer is correct.

The correct answer is: No minimum spanning tree contains AB

Question 8

Incorrect

Mark 0.00 out
of 1.00

The computational complexity of the following piece of code

```
for ( i=1; i < n; i *= 2 ) {  
    for ( j = n; j > 0; j /= 2 ) {  
        for ( k = j; k < n; k += 2 ) {  
            sum += (i + j * k );  
        }  
    }  
}
```

Select one:

- a. $O(n^3)$
- b. $O(n \log n)$
- c. $O(n \log(n^2))$ ✗
- d. $O(n(\log n)^2)$

Your answer is incorrect.

The correct answer is: $O(n(\log n)^2)$



Question 9

Correct

Mark 1.00 out
of 1.00

An undirected graph G has n nodes. Its adjacency matrix is given by an $n \times n$ square matrix whose

- (I) diagonal elements are '0's
- (II) non-diagonal elements are '1's

Which one of the following is true?

Select one:

- a. Graph G has no minimum spanning tree (MST)
- b. Graph G has a unique MST of cost $n-1$
- c. Graph G has multiple spanning trees of different costs
- d. Graph G has multiple distinct MST's each of cost $n-1$ ✓

Your answer is correct.

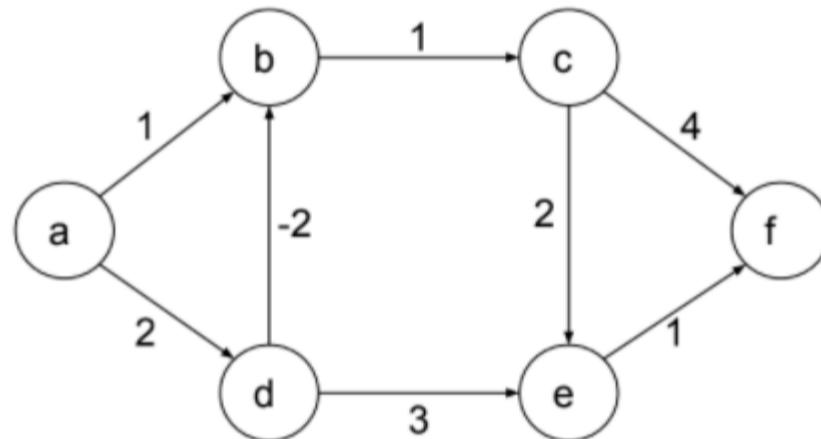
The correct answer is: Graph G has multiple distinct MST's each of cost $n-1$

Question 10

Correct

Mark 1.00 out
of 1.00

For the graph below, identify the route with the shortest distance to travel from **a** to **f**



Select one:

- a. a-d-b-c-e-f ✓
- b. a-b-c-f
- c. a-d-b-c-f
- d. a-d-e-f

Your answer is correct.

The correct answer is: a-d-b-c-e-f



Question 11

Correct

Mark 1.00 out
of 1.00

You have designed a new in-place comparison-based algorithm to sort. The list is divided into two parts, the sorted part at the left end and the unsorted part at the right end. Initially, the sorted part is empty and the unsorted part is the entire list. Then the smallest element is selected from the unsorted array and swapped with the leftmost element, and that element becomes a part of the sorted array. This process continues moving the unsorted array boundary by one element to the right until all the elements are sorted.



You are now required to trace the execution of the above algorithm you designed over the array below

{ 16, 21, 45, 8, 11, 53, 3, 26, 49}

Choose the state of the array after the 7th pass has been performed.

Select one:

- a. {3, 8, 11, 16, 21, 26, 53, 45, 49}
- b. {3, 8, 11, 16, 21, 26, 45, 53, 49} ✗
- c. {3, 8, 11, 16, 21, 53, 45, 26, 49}
- d. {3, 8, 11, 16, 21, 26, 45, 53, 49}
- e. {3, 8, 11, 16, 21, 26, 45, 49, 53}

Your answer is correct.

The correct answer is: {3, 8, 11, 16, 21, 26, 45, 53, 49}

Comment:

b and d are same answers hence can choose either of them.

Question 12

Incorrect

Mark 0.00 out
of 1.00

Which of the following statements is always correct for any two spanning trees for a graph?

Select one:

- a. Selected vertices have same degree ✗
- b. Have same number of edges
- c. Have same number of edges and sum of weights of edges is also same
- d. Sum of weights of edges is always same

Your answer is incorrect.

The correct answer is: Have same number of edges

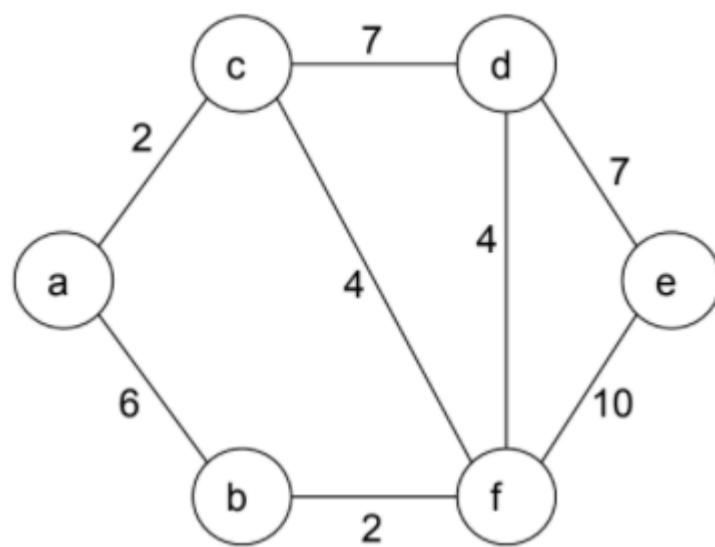


Question 13

Correct

Mark 1.00 out
of 1.00

Consider the following graph.



What is the cost of the minimum spanning tree generated using Kruskal's algorithm?

Select one:

- a. 15
- b. 19 ✓
- c. 23
- d. 24

Your answer is correct.

The correct answer is: 19

Question 14

Incorrect

Mark 0.00 out
of 1.00

What is direct addressing in the hash tables?

Select one:

- a. Same array position for all keys
- b. Fewer keys than array positions
- c. Fewer array positions than keys ✗
- d. Distinct array position for every possible key

Your answer is incorrect.

The correct answer is: Distinct array position for every possible key

Question 15

Correct

Mark 1.00 out
of 1.00

Consider an undirected random graph of eight vertices. The probability that there is an edge between a pair of vertices is $1/2$. What is the expected number of unordered cycles of length three?

Select one:

- a. 8
- b. 7 ✓
- c. $1/8$
- d. 1

Your answer is correct.

The correct answer is: 7



**Question 16**

Correct

Mark 1.00 out
of 1.00

Which of the following standard algorithms is not a Greedy algorithm?

Select one:

- a. Dijkstra's shortest path algorithm
- b. Prim's algorithm
- c. Kruskal algorithm
- d. Bellmen Ford Shortest path algorithm ✓

Your answer is correct.

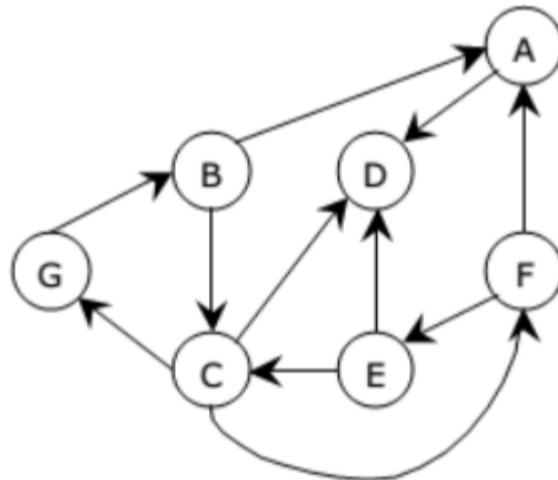
The correct answer is: Bellmen Ford Shortest path algorithm

Question 17

Incorrect

Mark 0.00 out
of 1.00

For the given graph, which edge does not occur in the depth-first search tree resulting from the depth-first search starting at node B?



Node	Adjacency List
A	D
B	A C
C	G D F
D	----
E	C D
F	E A
G	B

Select one:

- a. E-C
- b. C-F ✗
- c. F-E
- d. C-G

Your answer is incorrect.

The correct answer is: E-C

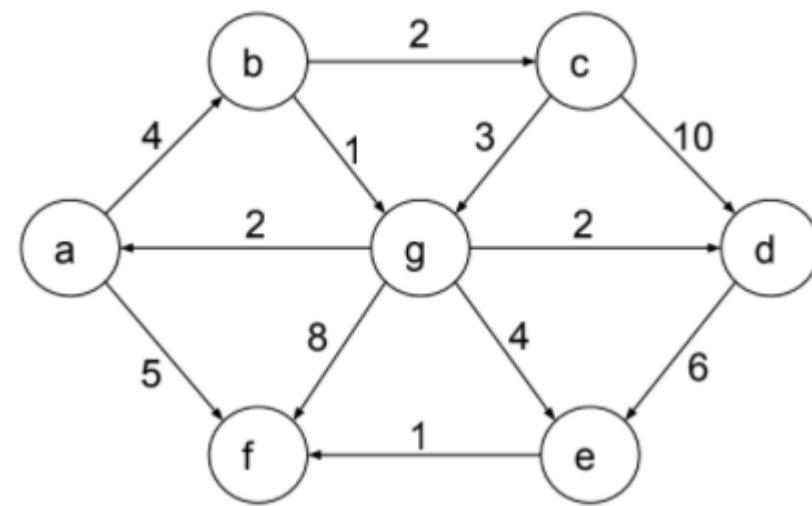


Question 18

Incorrect

Mark 0.00 out
of 1.00

What is the shortest distance from **b** to **f** on the following graph?



Select one:

- a. 6
- b. 4
- c. 9 ✗
- d. 8

Your answer is incorrect.

The correct answer is: 6

Question 19

Not answered

Marked out of
1.00

There are 4 cities A,B,C and D. And a travelling salesman has to travel to all the cities. A 2D matrix $D[][]$, where each row has the array of distances from that indexed city to all the other cities is given below. -1 denotes that there doesn't exist a path between those two indexed cities. The total distance of shortest cyclic path (starts from one city and ends in the same city) which covers all 4 cities and visit all the cities only once(except the same starting and destination city)is

$$D [][] = [[-1, 10, 15, 20], \\ [10, -1, 35, 25], \\ [15, 35, -1, 30], \\ [20, 25, 30, -1]]$$

Answer:

✗

The correct answer is: 80



Question 20

Incorrect

Mark 0.00 out
of 1.00

P and Q are two variables, where P is "qpqrr" and Q is "pqprqrp". The length of the longest common subsequence between P and Q is defined as 'x' and the number of such longest common subsequences between P and Q is defined as 'y'.

Find $3x + 10y = ?$

Note - Subsequence is not necessarily contiguous.

Select one:

- a. 34 ✖
- b. 36
- c. 43
- d. 42

Your answer is incorrect.

The correct answer is: 42

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Completed on Friday, 18 December 2020, 11:06 PM

Time taken 11 mins 2 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

The flowchart symbol used to denote data is

Select one:



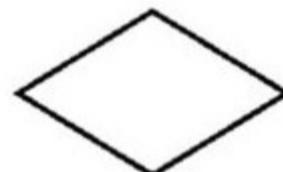
a.



b.



c.



d.

Your answer is correct.



The correct answer is:

Question 2

Correct

Mark 1.00 out
of 1.00

The operation of arranging a list of integers in the order of increasing value is

Select one:

a. Sorting ✓

b. Searching

c. Traversal

d. None of the Above

Your answer is correct.

The correct answer is: Sorting

Question 3

Correct

Mark 1.00 out
of 1.00

Following pseudocode is used to sort a list using bubble sort.
What is the missing code segment (indicated as <missing>)?

```
BUBBLE-SORT(A)
do
    swapped = false
    for i = 2 to A.length
        if A[i-1] > A[i]
            temp = A[i]
            <missing>
            swapped = true
    while swapped
```

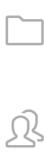
Select one:

- a.
 $A[i-1] = A[i]$
 $i = i+1$
- b.
 $A[i] = A[i+1]$
 $A[i-1] = temp$
- c.
 $A[i] = A[i-1]$
 $A[i-1] = temp$ ✓
- d.
 $A[i] = A[i-1]$
 $A[i+1] = temp$

Your answer is correct.

The correct answer is:

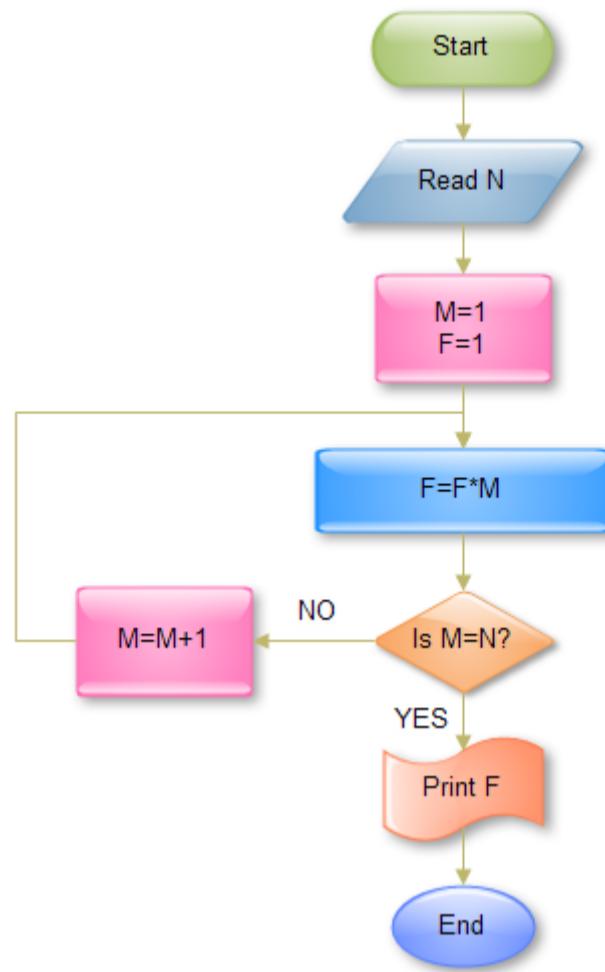
 $A[i] = A[i-1]$
 $A[i-1] = temp$ 

**Question 4**

Correct

Mark 1.00 out
of 1.00

What is the result (F) when the input (N) = 5?



Select one:

- a. 100
- b. 150
- c. 50
- d. 120 ✓

Your answer is correct.

The correct answer is: 120

Question 5

Correct

Mark 1.00 out
of 1.00

Finding the location of the element with a given value is:

Select one:

- a. Inserting
- b. Sorting
- c. Merging
- d. Search ✓

Your answer is correct.

The correct answer is: Search



**Question 6**

Correct

Mark 1.00 out
of 1.00

What is the smallest value of n such that an algorithm whose running time is $100n^2$ runs faster than an algorithm whose running time is 2^n on the same machine?

Select one:

- a. 10
- b. 5
- c. 15 ✓
- d. 20

Your answer is correct.

The correct answer is: 15

Question 7

Correct

Mark 1.00 out
of 1.00

Studying Algorithms and Data Structures helps to (Select all that applies)

Select one or more:

- a. Run a computer program
- b. Understand and solve problems ✓
- c. Improve currently existing solution ✓
- d. Solve problems in best way ✓

Your answer is correct.

The correct answers are: Understand and solve problems, Solve problems in best way, Improve currently existing solution

Question 8

Correct

Mark 1.00 out
of 1.00

Which of the following examples represent the worst case input for an insertion sort?

Select one:

- a. array in sorted order
- b. array sorted in reverse order ✓
- c. large array
- d. normal unsorted array

Your answer is correct.

The correct answer is: array sorted in reverse order

Question 9

Correct

Mark 1.00 out
of 1.00

The operation of processing each element in the list is known as

Select one:

- a. Sorting
- b. Traversal ✓
- c. Inserting
- d. Merging

Your answer is correct.

The correct answer is: Traversal

Question 10

Correct

Mark 1.00 out
of 1.00

Which of the following is a computational task?

Select one:

- a. What is $54 * 566$?
- b. Given a whole number A, is A prime? ✓
- c. What is $85 - 9 + 4$?
- d. All of the Above

Your answer is correct.

The correct answer is: Given a whole number A, is A prime?

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Completed on Saturday, 26 December 2020, 6:45 PM

Time taken 15 mins 54 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Express the function $\frac{n^3}{1000} - 100n^2 - 100n + 3$ in terms of Θ -notation.

Select one:

- a. $\Theta(\sqrt{n})$
- b. $\Theta(n^3)$ ✓
- c. $\Theta(\log(n))$
- d. $\Theta(n^2)$

Your answer is correct.

The correct answer is: $\Theta(n^3)$

Question 2

Correct

Mark 1.00 out of 1.00

The worst case complexity of Bubble sort algorithm is

Select one:

- a. $O(n^2)$ ✓
- b. $O(\log(n))$
- c. $O(n)$
- d. $O(n \log(n))$

Your answer is correct.

The correct answer is: $O(n^2)$

Question 3

Correct

Mark 1.00 out of 1.00

The Worst case occur in linear search algorithm when

Select one:

- a. Item is the last element in the array or is not there at all ✓
- b. Item is the last element in the array
- c. Item is somewhere in the middle of the array
- d. Item is not in the array at all

Your answer is correct.

The correct answer is: Item is the last element in the array or is not there at all



**Question 4**

Correct

Mark 1.00 out
of 1.00

Let $f(n) = 7n + 8$ and $g(n) = n$, find c (a suitable constant) such that $O(g(n)) = f(n)$ for $n \geq n_0$

Select one:

- a. 7
- b. 8 ✓
- c. There is no such constant

Your answer is correct.

The correct answer is: 8

Question 5

Correct

Mark 1.00 out
of 1.00

The time factor when determining the efficiency of algorithm is measured by

Select one:

- a. Counting microseconds
- b. Counting the kilobytes of algorithm
- c. Counting the number of statements
- d. Counting the number of key operations ✓

Your answer is correct.

The correct answer is: Counting the number of key operations

Question 6

Correct

Mark 1.00 out
of 1.00

Given $f(n) = n^3 + 2n^2 + 1000n + 1$, which of the following is correct about $f(n)$?

Select one or more:

- a. $\Omega(n^2)$ ✓
- b. $o(n^3)$
- c. $\Theta(n^4)$
- d. $O(n^4)$ ✓
- e. $\omega(n^3)$

Your answer is correct.

The correct answers are: $O(n^4)$, $\Omega(n^2)$ **Question 7**

Correct

Mark 1.00 out
of 1.00

The worst case complexity of linear search algorithm is

Select one:

- a. $O(n^2)$
- b. $O(\log n)$
- c. $O(n)$ ✓
- d. $O(n \log(n))$

Your answer is correct.

The correct answer is: $O(n)$ 

**Question 8**

Correct

Mark 1.00 out
of 1.00

The worst case complexity of Binary search algorithm is

Select one:

- a. $O(n^2)$
- b. $O(n)$
- c. $O(n \log(n))$
- d. $O(\log(n))$ ✓

Your answer is correct.

The correct answer is: $O(\log(n))$ **Question 9**

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int i, j, k = 0;
for (i = N / 2; i <= N; i++) {
    for (j = 2; j <= N; j = j * 2) {
        k = k + N / 2;
    }
}
```

Select one:

- a. $O(N * \text{Sqrt}(N))$
- b. $O(N)$
- c. $O(N * N)$
- d. $O(N * \log(N))$ ✓

Your answer is correct.

The correct answer is:

 $O(N * \log(N))$ **Question 10**

Correct

Mark 1.00 out
of 1.00

What is the time complexity of the following code?

```
int a = 0;
for (i = 0; i < N; i++) {
    for (j = N; j > i; j--) {
        a = a + i + j;
    }
}
```

Select one:

- a. $O(N)$
- b. $O(N * \text{Sqrt}(N))$
- c. $O(N * \log(N))$
- d. $O(N * N)$ ✓

Your answer is correct.

The correct answer is: $O(N * N)$ 



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Completed on Saturday, 9 January 2021, 10:12 AM

Time taken 17 mins 21 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Recursion is a method in which the solution of a problem depends on

Select one:

- a. Larger instances of the same problem
- b. Smaller instances of different problems
- c. Smaller instances of the same problem ✓
- d. Larger instances of different problems

Your answer is correct.

The correct answer is: Smaller instances of the same problem

Question 2

Correct

Mark 1.00 out of 1.00

A recursive function without If and Else conditions will always lead to?

Select one:

- a. Finite loop
- b. Incorrect Results
- c. Infinite Loop ✓
- d. Correct Results

Your answer is correct.

The correct answer is: Infinite Loop

Question 3

Correct

Mark 1.00 out of 1.00

In a little game, a computer is going to randomly select an integer from 1 to 1000. You'll keep guessing numbers until you find the computer's number, and the computer will tell you each time if your guess was too high or too low. How many guesses you need atmost in your worst case scenario given you use an optimal strategy?

Answer: 10



The correct answer is: 10

**Question 4**

Correct

Mark 1.00 out
of 1.00

Iteration and Recursion are the same programming approach

Select one:

- True
- False ✓

In recursion, the function calls itself till the base condition is reached whereas iteration means repetition of process for example in for-loops.

The correct answer is 'False'.

Question 5

Correct

Mark 1.00 out
of 1.00

Algorithm(s) which use divide and conquer approach

Select one or more:

- a. Insertion Sort
- b. Merge sort ✓
- c. Selection Sort
- d. Binary search ✓

Your answer is correct.

The correct answers are: Binary search, Merge sort

Question 6

Correct

Mark 1.00 out
of 1.00

What is the correct output of the following function for x=25

```
void RecurciveFunction(int x)
{
    if (x == 0)
        return;

    printf("%d", x%2);
    fun(x/2);
}
```

Select one:

- a. 11011
- b. 01100
- c. 10011 ✓
- d. 11111

Your answer is correct.

The correct answer is: 10011



**Question 7**

Correct

Mark 1.00 out
of 1.00**Worst case time complexity of Merge Sort**

Select one:

- a. $O(n^2)$
- b. $O(\log(n))$
- c. $O(n)$
- d. $O(n \log(n))$ ✓

Your answer is correct.

The correct answer is: $O(n \log(n))$ **Question 8**

Correct

Mark 1.00 out
of 1.00**Which of the following recursion functions can be used to calculate factorial of a number.**

Select one:

- a. $\text{fact}(n) = n * \text{fact}(1)$
- b. $\text{fact}(n) = n * \text{fact}(n)$
- c. $\text{fact}(n) = n * \text{fact}(n+1)$
- d. $\text{fact}(n) = n * \text{fact}(n-1)$ ✓

Your answer is correct.

The correct answer is: $\text{fact}(n) = n * \text{fact}(n-1)$ **Question 9**

Correct

Mark 1.00 out
of 1.00**Consider a situation where you don't have function to calculate power (`pow()`) function in C and you need to calculate x^n where x can be any number and n is a positive integer. What can be the best possible time complexity of your power function?**

Select one:

- a. $O(\text{LogLog}n)$
- b. $O(n\text{Log}n)$
- c. $O(\text{Log}n)$ ✓
- d. $O(n)$

Your answer is correct.

Power of a number can be calculated recursively.

Refer <https://www.geeksforgeeks.org/write-a-c-program-to-calculate-powxn/>The correct answer is: $O(\text{Log}n)$ 

**Question 10**

Correct

Mark 1.00 out
of 1.00**Consider Following Code**

```
void my_recursive_function()
{
    my_recursive_function();
}
```

```
int main()
{
    my_recursive_function();
    return 0;
}
```

What will happen when the above snippet is executed?

Select one:

- a. The code will be executed successfully and random output will be generated
- b. The code will show a compile time error
- c. The code will be executed successfully and no output will be generated
- d. The code will run for some time and stop when the stack overflows ✓

Your answer is correct.

The correct answer is: The code will run for some time and stop when the stack overflows

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◀ Zeetings : L3
Recursion and Divide
and Conquer

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NEXT ACTIVITY

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Correct

Mark 1.00 out of 1.00

What is the most appropriate base case for a recursive function to calculate the factorial of a number?

$$\text{fac}(n) = n * (n-1) * \dots * 1$$

Note: Factorial of zero is defined to be 1. The above function should be able to satisfy $\text{fac}(0)$ as well.

Select one:

- a. $n \geq 0$
- b. $n == 1$
- c. $n \leq 1$ ✓
- d. $n == 0$

Your answer is correct.

The correct answer is: $n \leq 1$

Question 2

Correct

Mark 1.00 out of 1.00

Order the steps involved in the Substitution Method in Solving Recurrences.

Guess the form of the solution

Step 1 ✓

Step 2 ✓

Step 3 ✓

Verify by induction**Solve for constants**

Your answer is correct.

The correct answer is: Guess the form of the solution → Step 1,
Verify by induction → Step 2, Solve for constants → Step 3

**Question 3**

Correct

Mark 1.00 out
of 1.00

Which is not a method for analyzing time complexity of recurrences?

Select one:

- a. Substitution Method
- b. Master Method
- c. Amortized Method ✓
- d. Recurrence Tree Method

Your answer is correct.

The correct answer is: Amortized Method

Question 4

Correct

Mark 1.00 out
of 1.00

The time complexity of a recursive algorithm is as follows: $T(n) = 2n$.

Considering this, mark the most suitable answer.

Select one:

- a. It has a double linear complexity.
- b. It has a linear time complexity and a linear space complexity.
- c. It has a linear time complexity. ✓
- d. It has a double linear time complexity.

Your answer is correct.

The correct answer is: It has a linear time complexity.

Question 5

Correct

Mark 1.00 out
of 1.00

What is the number of Recursive Calls are made when computing the sum of the list [3,5,4,8,1]?

Select one:

- a. 3
- b. 4 ✓
- c. 6
- d. 5

Your answer is correct.

The correct answer is: 4



Question 6

Correct

Mark 1.00 out
of 1.00

The solution to the recurrence $T(n) = 3T(n/3) + O(\lg n)$ is $T(n) = \Theta(n \lg n)$.

Select one:

- True
- False ✓

False.

Case 3 of the master theorem applies:

$f(n) = O(n^{\log_3(3)}) = O(n)$ for $f(n) = O(\lg n)$, hence, $T(n) = O(n)$.

The correct answer is 'False'.

Question 7

Correct

Mark 1.00 out
of 1.00

There are n people born between the year 1000 A.D and 2018 A.D, is it possible to sort them by birthdate in $O(n \log(n))$ time.

Select one:

- True ✓
- False

Birthdate can be represented in a number format in a database, then we can use **Merge Sort** to sort them by birthdate.

The correct answer is 'True'.

Question 8

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for runtime $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 16T(n/4) + n!$$

Select one:

- a. $T(n) = \Theta(n!)$ ✓
- b. $T(n) = \Theta(n^2)$
- c. Master Theorem does not apply.
- d. $T(n) = n \log(n!)$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n!)$



**Question 9**

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 2T(n/3) + nlgn$$

Select one:

- a. $T(n) = \Theta(lg(n))$
- b. $T(n) = \Theta(n)$
- c. $T(n) = \Theta(n^2lg(n))$
- d. $T(n) = \Theta(nlg(n))$



The correct answer is: $T(n) = \Theta(nlg(n))$

Question 10

Correct

Mark 1.00 out
of 1.00

Select the asymptotic upper and lower bounds for $T(n)$ in the following recurrence. Assume that $T(n)$ is constant for $n \leq 3$. Make your bounds as tight as possible.

$$T(n) = 3T(n/5) + lg^2(n)$$

Select one:

- a. $T(n) = \Theta(log_2(n))$
- b. $T(n) = \Theta(n^{log_5(3)})$
- c. $T(n) = \Theta(n^{log_3(5)})$
- d. $T(n) = \Theta(lg^2(n))$



Your answer is correct.

The correct answer is: $T(n) = \Theta(n^{log_5(3)})$



**Question 11**

Correct

Mark 1.00 out
of 1.00

For the following recurrence, select the correct expression for run time $T(n)$ if the recurrence can be solved using Master Theorem, Otherwise, indicate that the Master Theorem does not apply.

$$T(n) = 7T(n/3) + n^2$$

Select one:

- a. $T(n) = \Theta(n^2)$ ✓
- b. Master Theorem does not apply.
- c. $T(n) = \Theta(n)$
- d. $T(n) = \Theta(n^2 \log(n))$

Your answer is correct.

The correct answer is: $T(n) = \Theta(n^2)$ **Question 12**

Correct

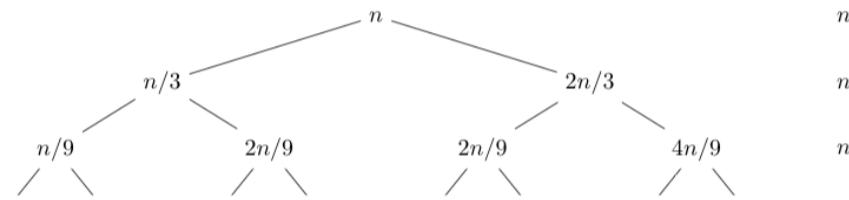
Mark 1.00 out
of 1.00

Recursion Tree is one way to analyze recursive functions.

Consider a function with following time complexity.

$$T(n) = T(n/3) + T(2n/3) + n$$

Following figure shows the first 3 levels of the recursion tree.



What is/are the number(s) which can appear in the next (4th) level in this recursion tree?

Select one or more:

- a. $16n/27$
- b. $2n/27$ ✓
- c. $n/27$ ✓
- d. $8n/27$ ✓

Your answer is correct.

The correct answers are: $n/27, 2n/27, 8n/27$ 

Question 13

Correct

Mark 1.00 out
of 1.00

Solve the following Recursive Algorithm:

$$T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T\left(\frac{n}{2}\right) + F'(n) & \text{if } n>1 \end{cases}$$

Select one:

- a. $T(n) = O(n^2)$
- b. $T(n) = O(\log(n))$
- c. $T(n) = O(n)$
- d. $T(n) = O(n\log(n))$



Your answer is correct.

The correct answer is: $T(n) = O(n\log(n))$ **Question 14**

Correct

Mark 1.00 out
of 1.00

Given a set 'S' of n integers and another integer x , an algorithm should determine whether or not there exists two elements in S whose sum is exactly x . A possible algorithm for this task is described below.

- 1) Sort the elements in S using any efficient sorting algorithm.
- 2) Remove the last element from S . Let y be the value of the removed element.
- 3) If S is non-empty, look whether an element z exist in S where $z=x-y$
- 4) If S contains such an element z , then stop, since we have found y and z such that $x=y+z$; otherwise repeat Step 2.
- 5) If S is empty, then no two elements in S sum to x .

Select the correct statement(s) regarding above approach.

Select one or more:

- a. Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity. ✓
- b. Best time complexity to do Step 3 is $\Theta(n)$.
- c. Time complexity of this algorithm is $\Theta(n \lg n)$. ✓
- d. There are algorithms which can solve this task with better time complexity than above described algorithm

Your answer is correct.

The correct answers are: Step 1 can be achieved through merge sort with $\Theta(n \lg n)$ time complexity., Time complexity of this algorithm is $\Theta(n \lg n)$.



Question 15

Correct

Mark 1.00 out
of 1.00

Consider the following sorting algorithm.

NEW-SORT (A, i, j)if $A[i] > A[j]$ then exchange $A[i] \leftrightarrow A[j]$ if $i+1 \geq j$

then return

 $k \leftarrow \lfloor (j - i + 1) / 3 \rfloor$ /* Round down */NEW-SORT (Δ , i , $i-k$) /* First two-thirds */**PREVIOUS ACTIVITY** [Lecture Slides:
Analyzing Recurrences](#)[Jump to...](#)**NEXT ACTIVITY**[**Lecture Slides: Analyzing
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Completed on Thursday, 28 January 2021, 10:43 AM

Time taken 12 mins 21 secs

Marks 12.00/12.00

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

What is the output of the following code segment on python dictionary:

`a = {(1,2):1,(2,3):2}`

`Print(a[1,2])`

Answer: 1



The correct answer is: 1

Question 2

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding implementing data structures

Select one or more:

- a. A queue can be implemented using two stacks. ✓
- b. A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time ✓
- c. A stack can be implemented using two queues. ✓
- d. A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time ✓

Your answer is correct.

The correct answers are: A stack can be implemented using a singly linked list with the operations PUSH and POP still taking $O(1)$ time, A queue can be implemented using a singly linked list with the operations ENQUEUE and DEQUEUE still taking $O(1)$ time, A queue can be implemented using two stacks., A stack can be implemented using two queues.



**Question 3**

Correct

Mark 1.00 out
of 1.00

Choose the output of the following code segment on python list

:

 $A = [1, 2, 3, 4, 5, 6, 7, 8, 9]$ $A[::2] = 10, 20, 30, 40, 50, 60$ $\text{Print}(A)$

Select one:

- a. [1, 10, 3, 20, 5, 30, 7, 40, 9, 50, 60]
- b. [1, 2, 10, 20, 30, 40, 50, 60]
- c. Value error: attempt to assign sequence of size 6 to extended slice of size 5 ✓
- d. [10, 2, 20, 4, 30, 6, 40, 8, 50, 60]

The correct answer is: Value error: attempt to assign sequence of size 6 to extended slice of size 5

Question 4

Correct

Mark 1.00 out
of 1.00

Consider the following postfix notations and find out the answer using stack operations:

8, 14, 6, +, *, 8, 40, 20, /, +, * is?

Select one:

- a. 16000
- b. 160
- c. 1600 ✓
- d. 16

The correct answer is: 1600

Question 5

Correct

Mark 1.00 out
of 1.00

Choose the correct statement about an array

Select one:

- a. Arrays cannot grow dynamically
- b. Array is not a data structure
- c. Number of elements in an array can be increased ✓
- d. You need to always declare the number of elements in an array

The correct answer is: Number of elements in an array can be increased



**Question 6**

Correct

Mark 1.00 out
of 1.00

Which of the following statements are correct regarding arrays and list

Select one or more:

- a. One advantage of the array compared to list is the ability to perform random access without additional data structures. ✓
- b. Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array. ✓
- c. In a List, elements are spread about in memory, but linked together. ✓
- d. Insertion is easier in the array compared to list.

Your answer is correct.

The correct answers are: Arrays are continuous in memory, which makes it hard (in a performance sense) to insert elements in the middle of the array., One advantage of the array compared to list is the ability to perform random access without additional data structures., In a List, elements are spread about in memory, but linked together.

Question 7

Correct

Mark 1.00 out
of 1.00

Which of the following is/are advantages of abstract data types(ADT)

Select one:

- a. ADT abstracts away from a specific representation to focus on the semantic meaning of the data
- b. An AST may have different implementations of it with different performance characteristics. So, for different use cases, specific implementations of an ADT that will be more efficient for that use case can be used.
- c. When an AST is used in a program, most of the program becomes independent of that abstract data type's representation, so that representation can be improved without breaking the entire program.
- d. All are correct ✓

Your answer is correct.

The correct answer is: All are correct

Question 8

Correct

Mark 1.00 out
of 1.00

Which one of the following is a queue

Select one:

- a. Array
- b. LIFO list
- c. Multi dimensional array
- d. FIFO list ✓

The correct answer is: FIFO list



**Question 9**

Correct

Mark 1.00 out
of 1.00

Which of the following statement(s) is/are correct regarding dictionary data structure.

Select one or more:

- a. A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value. ✓
- b. In a dictionary, if the value of a key is null, then search operation on that dictionary will return that key as non-existent.
- c. Dictionaries are often implemented as hash tables. ✓
- d. Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements. ✓

Your answer is correct.

The correct answers are: A dictionary has a set of *keys* and each key has a single associated *value* and when presented with a key, the dictionary will return the associated value., Dictionaries are often implemented as hash tables., Dictionaries typically support operations such as testing for existence of a key, inserting elements and deleting elements.

Question 10

Correct

Mark 1.00 out
of 1.00

Which one of the following is not a property of an ADT

Select one:

- a. Implementation dependent ✓
- b. Has a data specification
- c. Implementation independent
- d. Has set of operations

The correct answer is: Implementation dependent

Question 11

Correct

Mark 1.00 out
of 1.00

The procedure LIST-DELETE removes an element x from a linked list L. The procedure must be given a pointer to x, and it then "splices" x out of the list by updating pointers. Choose the correct pseudo code segments.

LIST-DELETE(L,x)

```
if x.previous != NIL
    x.previous.next = x.next
```

```
else L.head = x.next
    if x.next = x.next
```

Mark 1.00 out of 1.00

```
x.next.previous = x.previous
```

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◀ Lecture Slides: Basic Data Structures

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Time taken 9 mins 41 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Which of the following binary trees are BSTs?

(1)	(2)	(3)	(4)
A	10	cat	15
/ \	/	/ \	/ \
B C	5	bat rat	5 22
	/	/	\ \
	-3	ant	20 30

Select one:

- a. 2,4
- b. 2,3 ✓
- c. 1,4
- d. None of these

Your answer is correct.

The correct answer is: 2,3

Question 2

Correct

Mark 1.00 out of 1.00

For a set of numbers {1,2,3,4} ,How many different unique binary search trees can be drawn?

Answer: 14



The correct answer is: 14

Question 3

Correct

Mark 1.00 out of 1.00

Select whether the following statement is True/False.

Binary Search is appropriate for linked lists

Select one:

- True
- False ✓

The correct answer is 'False'.

**Question 4**

Correct

Mark 1.00 out
of 1.00

By which Factor does the Binary Search Narrows the Search?

Select one:

- a. Two (2) times at each iteration ✓
- b. Four (4) times at each iteration
- c. Two (2) times at each search operation
- d. Does not narrow the search by any factor

The correct answer is: Two (2) times at each iteration

Question 5

Correct

Mark 1.00 out
of 1.00

Resulting tree of binary search tree dose not depend on the value insertion order

Select one:

- a. True
- b. False ✓

The correct answer is 'False'.

Question 6

Correct

Mark 1.00 out
of 1.00

What is the running time of Linear Search when all the elements in a list are sorted?

n - Number of Elements in List

Select one:

- a. $O(\log(n))$
- b. $O(n \log(n))$
- c. $O(n^2)$
- d. $O(n)$ ✓

The correct answer is: $O(n)$

Question 7

Correct

Mark 1.00 out
of 1.00

For the set of { 1, 4, 5, 10, 16, 17, 21} of keys, many different binary search trees can be built. Which of the following can be their possible heights

Select one or more:

- a. 2 ✓
- b. 7
- c. 3 ✓
- d. 6 ✓

Your answer is correct.

The correct answers are: 2, 3, 6



**Question 8**

Correct

Mark 1.00 out
of 1.00

Select correct statement about K-ary Tree

Select one or more:

- a. K-ary tree can have K^d nodes in the depth of d ✓
- b. In K-ary tree all internal nodes have exactly K children
- c. K-ary is special type of binary tree.
- d. In K-ary tree children node values are always lower than the parent.

Your answer is correct.

The correct answer is: K-ary tree can have K^d nodes in the depth of d**Question 9**

Correct

Mark 1.00 out
of 1.00

What is the largest number of nodes BST can have with depth of

3

Answer: 15



The correct answer is: 15



**Question 10**

Correct

Mark 1.00 out
of 1.00***BINARY_SEARCH(List, Key)****if length of the List is 0* Return false ✓*else if the middle element is equal to Key* return true/ return index ✓*else if the Key is less than the middle element* BINARY_SEARCH(First Half of the List, Key) ✓*Else* BINARY_SEARCH(Second Half of List, Key) ✓

Your answer is correct.

The correct answer is:

BINARY_SEARCH(List, Key)*if length of the List is 0***[Return false]***else if the middle element is equal to Key***[return true/ return index]***else if the Key is less than the middle element***[BINARY_SEARCH(First Half of the List, Key)]***Else***[BINARY_SEARCH(Second Half of List, Key)]**

PREVIOUS ACTIVITY

◀ [Lecture Slides: Binary Search Trees](#)

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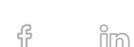
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Completed on Saturday, 20 February 2021, 2:37 PM

Time taken 8 mins 52 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

BUILD-MIN-HEAP(A)

```
A.heapsize = A.length  
for i = A.length/2 down to 1  
    MIN-HEAPIFY(A,i)
```

Running time for the "MIN-HEAPIFY" operation is $O(\log n)$. What is the time complexity of "BUILD-MIN-HEAP" operation.

Select one:

- a. $O(n^2 \log n)$
- b. $O(n)$
- c. $O(n \log n)$
- d. $O(\log n^2)$

Your answer is correct.

<https://www.growingwiththeweb.com/data-structures/binary-heap/build-heap-proof/>

The correct answer is: $O(n)$

Question 2

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of BUILDHEAP operation?

Select one:

- a. $O(\log(n))$
- b. $O(n^2)$
- c. $O(n \log(n))$
- d. $O(n)$

The correct answer is: $O(n)$



**Question 3**

Correct

Mark 1.00 out
of 1.00

Consider a binary min heap containing n elements and every node is having degree 2 (i.e. full binary min heap tree). What is the probability of finding the largest element at the last level ?

Select one:

- a. $1/2$
- b. $1/2^n$
- c. 1 ✓
- d. $1/n$

Your answer is correct.

The correct answer is: 1

Question 4

Correct

Mark 1.00 out
of 1.00

Suppose we are sorting an array of eight integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28

How many heapify operations have been performed on root of heap?

Select one:

- a. 2 ✓
- b. 1
- c. 3 or 4
- d. 5 or 6

Your answer is correct.

The correct answer is: 2

Question 5

Correct

Mark 1.00 out
of 1.00

What is the typical running time of a heap sort algorithm?

Select one:

- a. $O(N)$
- b. $O(N \log N)$ ✓ The total running time of a heap sort algorithm is mathematically found to be $O(N \log N)$.
- c. $O(N^2)$
- d. $O(\log N)$

Your answer is correct.

The correct answer is: $O(N \log N)$



Question 6

Correct

Mark 1.00 out
of 1.00

What is the worst-time complexity of HeapExtract operation?

Select one:

- a. $O(n)$
- b. $O(n^2)$
- c. $O(\log(n))$ ✓
- d. $O(n \log(n))$

The correct answer is: $O(\log(n))$

Question 7

Correct

Mark 1.00 out
of 1.00

Which of the following is not a standard in-place sorting algorithm?

Select one:

- a. Merge sort ✓
- b. Heap sort
- c. Quick sort
- d. Selection sort

The correct answer is: Merge sort



Question 8

Correct

Mark 1.00 out
of 1.00

What is the time complexity of following algorithm which is created to return the smallest index i at which $x \leq a[i]$ for a given array?

```
func Search(a []int, x int) int {
    switch len(a) {
    case 0:
        return 0
    case 1:
        if x <= a[0] {
            return 0
        }
        return 1
    }
    mid := 1 + (len(a)-1)/2
    if x <= a[mid-1] {
        return Find(a[:mid], x)
    }
    return mid + Find(a[mid:], x)
}
```

Select one:

- a. $O(n)$
- b. $O(n \log n)$
- c. $O(\log n)$ ✓
- d. $O(n^2)$

Your answer is correct.

We simplify the problem by only computing the asymptotic time complexity, and let all constants be 1. Then the recurrences become

- $T(1) = 1$, (*)
- $T(n) = 1 + T(n/2)$, when $n > 1$.

PREVIOUS ACTIVITY

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Time taken 15 mins 6 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

Using the collision resolution strategy of Linear Probing, fill in the missing elements in the Hash Table, where $H(k) = k \% M$ and $M = 5$, after executing all the operations shown below.

Insert: 5

Insert: 10

Insert: 11

Insert: 12

Insert: 13

0	1	2	3	4
?	?	?	?	?

Write your answer as comma separated values with no spaces.

Eg - 5,11,10,12,13

Answer: 5,10,11,12,13



The correct answer is: 5,10,11,12,13

Question 2

Correct

Mark 1.00 out of 1.00

Suppose we have an empty Hash Table, where $H(k) = k \% M$ and $M = 7$. After inserting the keys 31, 77, and 708 into our Hash Table (in that order), which index will the key 49 end up hashing to using the collision resolution strategy of Linear Probing?

Answer: 2



Collision occurs at index 0, since index 1 is already occupied(708), the answer is 2

The correct answer is: 2

**Question 3**

Correct

Mark 1.00 out
of 1.00

The time complexity of all operations associated with Direct Address table are not $O(1)$

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 4

Correct

Mark 1.00 out
of 1.00

What is the load factor?

Select one:

- a. Average chain length ✓ In simple chaining, load factor is the average number of elements stored in a chain, and is given by the ratio
- b. Average array size
- c. Average hash table length
- d. Average key size

Your answer is correct.

The correct answer is: Average chain length

Question 5

Correct

Mark 1.00 out
of 1.00

A hash function is

Select one:

- a. A function with allocated memory to keys
- b. A function that creates an array
- c. A function that computes the location of the key in the array ✓
- d. None of the mentioned

The correct answer is: A function that computes the location of the key in the array



Question 6

Correct

Mark 1.00 out
of 1.00

The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function $h(k) = k \bmod 10$ and linear probing. What is the resultant hash table?



Select one:

0	
1	
2	12
3	13
4	
5	5
6	
7	
8	18
9	

 a.

0	
1	
2	12, 2
3	13, 3, 23
4	
5	5, 15
6	
7	
8	18
9	

 b.

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

 c.

0	
1	
2	2
3	23
4	
5	15
6	
7	
8	18
9	

 d.

Your answer is correct.





The correct answer is:

0	
1	
2	12
3	13
4	2
5	3
6	23
7	5
8	18
9	15

Question 7

Correct

Mark 1.00 out
of 1.00

Given the values {2341, 4234, 2839, 430, 22, 397, 3920}, a hash table of size 7, and hash function $h(x) = x \bmod 7$, select the resulting tables after inserting the values in the given order with chaining

Select one:

- a. 0 [3920] 1 [430] 2 [22] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- b. 0 [397] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [430] 6 [4234]
- c. 0 [430] 1 [22] 2 [3920] 3 [2341] 4 [2839] 5 [397] 6 [4234]
- d. 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234] ✓

The correct answer is: 0 [3920], 1 [22], 2 [], 3 [2341, 430], 4 [2839], 5 [397], 6 [4234]

Question 8

Correct

Mark 1.00 out
of 1.00

Using division method, in a given hash table of size 157, the key of value 172 be placed at position

Select one:

- a. 15 ✓
- b. 72
- c. 19
- d. 17

Your answer is correct.

The correct answer is: 15

Question 9

Correct

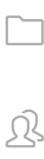
Mark 1.00 out
of 1.00

Which one of the following hash functions on integers will distribute keys most uniformly over 10 buckets numbered 0 to 9 for i ranging from 0 to 20?

Select one:

- a. $h(i) = i^2 \bmod 10$
- b. $h(i) = i^3 \bmod 10$ ✓
- c. $h(i) = (11 * i^2) \bmod 10$
- d. $h(i) = (12 * i) \bmod 10$

The correct answer is: $h(i) = i^3 \bmod 10$

**Question 10**

Correct

Mark 1.00 out
of 1.00

A good hash approach is to derive the hash value that is expected to be dependent on any patterns that might exist in the data.

Select one:

- True
- False ✓

A hash value is expected to be unrelated or independent of any patterns in the distribution of keys.

The correct answer is 'False'.

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HashTables

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Completed on Wednesday, 24 March 2021, 11:27 PM

Time taken 15 mins 24 secs

Grade 9.00 out of 10.00 (90%)

Question 1

Correct

Mark 1.00 out
of 1.00

The Data structure used in standard implementation of Breadth First Search is?

Select one:

- a. Stack
- b. Linked List
- c. Queue ✓
- d. Tree

Your answer is correct.

The correct answer is: Queue

Question 2

Correct

Mark 1.00 out
of 1.00

When the Breadth First Search of a graph will be unique?

Select one:

- a. When the graph is a n-ary Tree
- b. When the graph is a Linked List ✓
- c. When the graph is a Binary Tree
- d. When the graph has no cycle

Your answer is correct.

The correct answer is: When the graph is a Linked List

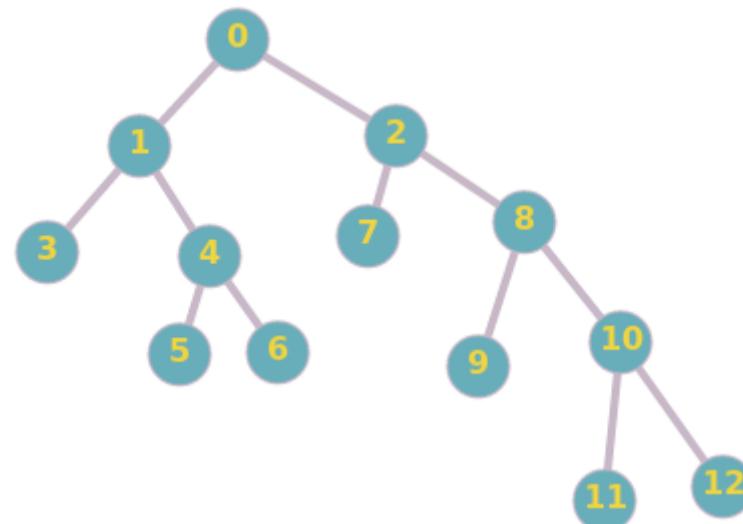


Question 3

Correct

Mark 1.00 out
of 1.00

Find the output of Depth-First search of the following tree using pre-order traversal :



Select one:

- a. 3 5 6 4 1 7 9 11 12 10 8 2 0
- b. 3 1 5 4 6 0 7 2 9 8 11 10 12
- c. 0 1 3 4 5 6 2 7 8 9 10 11 12 ✓
- d. 0 1 2 3 4 7 8 5 6 9 10 11 12

Your answer is correct.

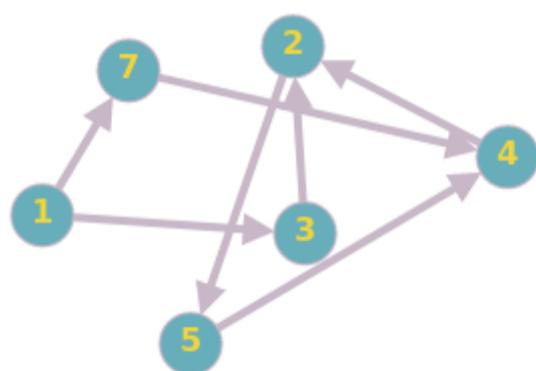
The correct answer is: 0 1 3 4 5 6 2 7 8 9 10 11 12

Question 4

Incorrect

Mark 0.00 out
of 1.00

Find an output of Depth-First traversal of the following graph starting from node 1:



Select one:

- a. 1 7 3 4 2 5
- b. 1 3 2 5 4 7
- c. 1 3 7 2 4 5 ✗
- d. 1 3 7 4 2 5

Your answer is incorrect.

The correct answer is: 1 3 2 5 4 7

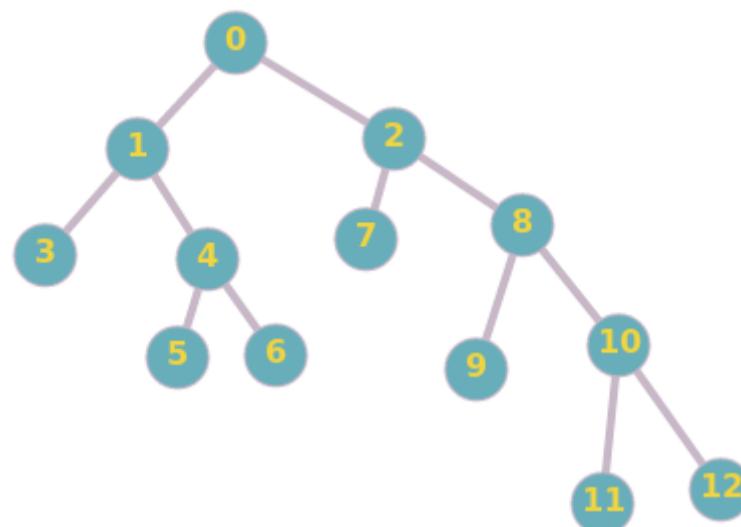


Question 5

Correct

Mark 1.00 out
of 1.00

Find the output of Depth-First search of the following tree using in-order traversal:



Select one:

- a. 0 1 3 4 5 6 2 7 8 9 10 11 12
- b. 3 1 5 4 6 0 7 2 9 8 11 10 12 ✓
- c. 0 1 2 3 4 7 8 5 6 9 10 11 12
- d. 3 5 6 4 1 7 9 11 12 10 8 2 0

Your answer is correct.

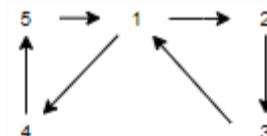
The correct answer is: 3 1 5 4 6 0 7 2 9 8 11 10 12

Question 6

Correct

Mark 1.00 out
of 1.00

Which of the following is a possible result of depth first traversal of the given graph (consider 1 to be source element)?



Select one:

- a. 1 4 5 1 2 3
- b. 1 4 5 3 2
- c. 1 2 3 4 5 ✓
- d. 1 2 3 1 4 5

Your answer is correct.

<https://www.sanfoundry.com/data-structure-questions-answers-non-recursive-depth-first-search/>

As 1 is the source element so it will be considered first. Then we start exploring the vertices which are connected to 1. So there will be two possible results - 1 2 3 4 5 and 1 4 5 2 3.

The correct answer is: 1 2 3 4 5



**Question 7**

Correct

Mark 1.00 out
of 1.00

Traversal of a graph is different than tree because.

Select one:

- a. There can be a loop in the graph ✓
- b. DFS on a graph uses stack, while inorder traversal is recursive
- c. Both (a) and (b)
- d. None of the above

Your answer is correct.

The correct answer is: There can be a loop in the graph

Question 8

Correct

Mark 1.00 out
of 1.00

Consider following statement and state it is true or false

A DFS of a directed graph always produces the same number of tree edges, i.e. independent of the order in which the vertices are considered for DFS.

Select one:

- True
- False ✓

a-----> b

If you start from a , one tree edge

If you start from b,no tree edge

The correct answer is 'False'.

Question 9

Correct

Mark 1.00 out
of 1.00

The degree of a vertex of a graph is the number of edges that are incident to the vertex. Which of the following statement(s) is/are true regarding degree of vertices of a undirected graph?

Select one or more:

- a. A graph can exist such that its total number of vertices is 25 and all the vertices are connected with exactly 7 other vertices
- b. Sum of degrees of all vertices = $2 * \text{Total number of edges}$ ✓
- c. Total number of vertices with even number of degrees is odd
- d. Total number of vertices with odd number of degrees is even. ✓

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◀ Lecture Slides:
Introduction to Graphs

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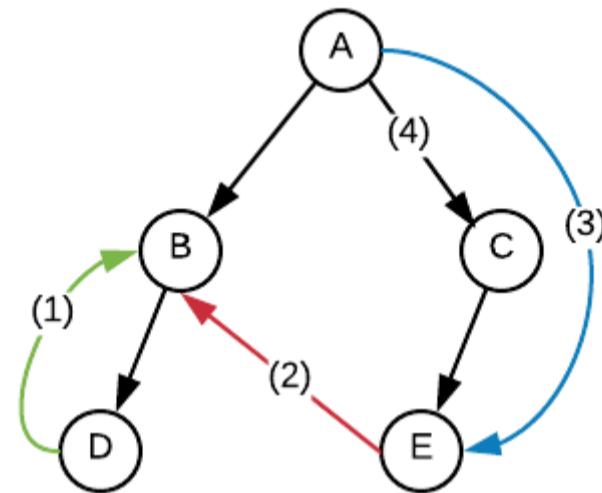
Time taken 18 mins 10 secs

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Question 1

Correct

Mark 1.00 out
of 1.00



Match the edges with the appropriate type of edge.

Red Edge (2)	Cross Edge	✓
Black Edges (4)	Tree Edge	✓
Blue Edge (3)	Forward Edge	✓
Green Edge (1)	Back Edge	✓

The correct answer is: Red Edge (2) → Cross Edge, Black Edges (4) → Tree Edge, Blue Edge (3) → Forward Edge, Green Edge (1) → Back Edge

**Question 2**

Correct

Mark 1.00 out
of 1.00

Select the correct algorithms for computing Minimum Spanning Trees

A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it

Prim's Algorithm



A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph.

Kruskal's Algorithm



Your answer is correct.

The correct answer is: A greedy algorithm that starts with a single vertex from the original graph and builds the **MST** by iteratively adding the least costly edges that stem from it → Prim's Algorithm, A greedy algorithm that starts with a forest of vertices without any edges and builds the **MST** by iteratively adding the least costly edges from the entire graph. → Kruskal's Algorithm

Question 3

Correct

Mark 1.00 out
of 1.00

A spanning tree for an undirected graph G is

Select one or more:

- a. Contains all the edges of G ,
- b. Has no cycles ✓
- c. A connected graph ✓
- d. An undirected graph ✓

Your answer is correct.

The correct answers are: An undirected graph, Has no cycles, A connected graph

Question 4

Correct

Mark 1.00 out
of 1.00

Select the two basic properties of Spanning Tree.

Select one or more:

- a. Acyclic ✓
- b. Not Connected
- c. Connected ✓
- d. Cyclic

The correct answers are: Connected, Acyclic



**Question 5**

Correct

Mark 1.00 out
of 1.00

Single-source shortest-path algorithm, such as Breadth First Search algorithms can be used to find a spanning tree for a undirected graph

Select one:

- True ✓
 False

The correct answer is 'True'.

Question 6

Correct

Mark 1.00 out
of 1.00

Consider a complete undirected graph with vertex set $\{0, 1, 2, 3, 4\}$. W_{ij} entry in the matrix W below is the weight of the edge $\{i, j\}$. What is the minimum possible weight of a spanning tree T in this graph such that vertex 0 is a leaf node in the tree T ?

$$W = \begin{pmatrix} 0 & 1 & 8 & 1 & 4 \\ 1 & 0 & 12 & 4 & 9 \\ 8 & 12 & 0 & 7 & 3 \\ 1 & 4 & 7 & 0 & 2 \\ 4 & 9 & 3 & 2 & 0 \end{pmatrix}$$

Select one:

- a. 7
 b. 9
 c. 8
 d. 10 ✓

The correct answer is: 10

Question 7

Correct

Mark 1.00 out
of 1.00

Consider a weighted complete graph G on the vertex set V_1, V_2, \dots, V_n such that the weight of the edge (V_i, V_j) is $2|i - j|$. The weight of a minimum spanning tree of G is:

Select one:

- a. nC_2
 b. $2n - 2$ ✓
 c. $n - 1$
 d. n^2

The correct answer is: $2n - 2$

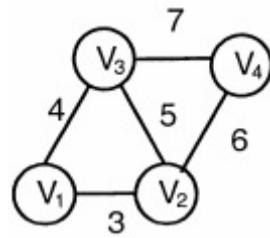


Question 8

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What is the length of the path from V_5 to V_6 in the MST of the above graph with $n = 10$?

Select one:

- a. 31 ✓
- b. 25
- c. 11
- d. 41

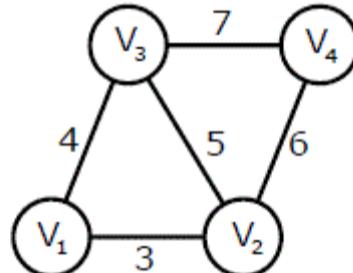
The correct answer is: 31

Question 9

Correct

Mark 1.00 out
of 1.00

An undirected graph $G(V, E)$ contains $n(n > 2)$ nodes named $V_1, V_2, V_3, \dots, V_n$. Two nodes V_i, V_j are connected if and only if $0 < |i - j| \leq 2$. Each edge (V_i, V_j) is assigned a weight $i + j$. A sample graph with $n=4$ is shown below.



What will be the cost of the minimum spanning tree (MST) of such a graph with n nodes?

Select one:

- a. $\frac{1}{12}(11n^2 - 5n)$
- b. $6n - 11$
- c. $2n + 1$
- d. $n^2 - n + 1$



The correct answer is: $n^2 - n + 1$



PREVIOUS ACTIVITY

◀ Lecture Slides:
Minimum Spanning
Trees

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Lecture Slides: Single-
Source Shortest Path ►



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Time taken 20 mins 44 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Your answer is correct.

The correct answer is:

The [Relaxation] process updates the costs of all the vertices V, connected to a vertex U, if we could improve the best estimate of the shortest path to V by including (U,V) in the path to V.

Question 2

Correct

Mark 1.00 out of 1.00

What is the worst case space complexity of Bellman Ford algorithm?

Select one:

- a. $O(|V|)$ ✓
- b. $O(|E| |V|)$
- c. $O(|E|)$
- d. $O(|V|^2)$

The correct answer is: $O(|V|)$

Question 3

Correct

Mark 1.00 out of 1.00

What is the time complexity of Dijkstra's shortest path algorithm?

Select one:

- a. $O(|V|^2)$
- b. $O(|E| |V|)$
- c. $O(|E| \log |V|)$ ✓
- d. $O(|V|)$

Your answer is correct.

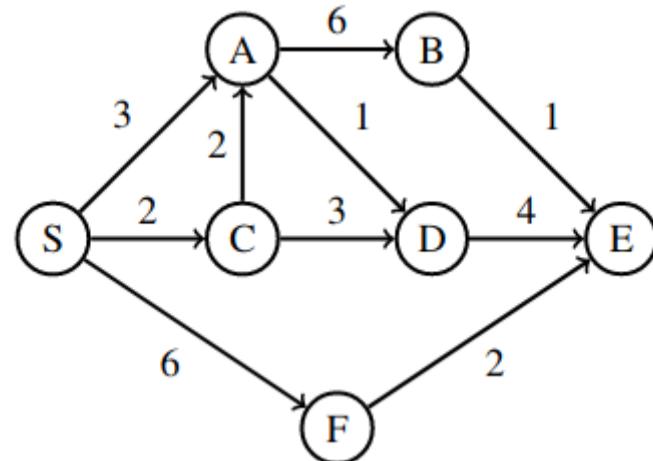
The correct answers are: $O(|E| \log |V|)$, $O(|V|^2)$

**Question 4**

Correct

Mark 1.00 out
of 1.00

Run Dijkstra's algorithm on the following directed graph, starting at vertex S. What is the order in which vertices get removed from the priority queue?



Select one:

- a. S, A, C, F, D, E, B
- b. S, C, A, D, F, E, B ✓
- c. F, S, A, C, D, E, B
- d. B, A, C, F, D, E, S

Your answer is correct.

The correct answer is: S, C, A, D, F, E, B

Question 5

Correct

Mark 1.00 out
of 1.00

Dijkstra's algorithm may not terminate if the graph contains negative-weight edges.

Select one:

- True
- False ✓

It always terminates after $|E|$ relaxations and $|V| + |E|$ priority queue operations, but may produce incorrect results.

The correct answer is 'False'.

Question 6

Correct

Mark 1.00 out
of 1.00

If all edges have the same weight in an undirected graph, which algorithm will find the shortest path between two nodes more efficiently?

Select one:

- a. Depth-First Search
- b. Dijkstra
- c. Bellman-Ford
- d. Breadth-First Search ✓

Breadth-First Search has time complexity $O(|V| + |E|)$.

The correct answer is: Breadth-First Search



**Question 7**

Correct

Mark 1.00 out
of 1.00

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all same. - Breadth First Search ✓
2. For graphs where the edge-weights are non-negative. - Dijkstra's Alogrithm ✓
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists. - Bellman-Ford Algorithm ✓

Your answer is correct.

The correct answer is:

What are the suitable algorithms each of these scenarios?

1. For graphs where the edge-weights are either zero or all same. - [Breadth First Search]
2. For graphs where the edge-weights are non-negative. - [Dijkstra's Alogrithm]
3. For graphs where the edge-weights may be negative, but no negative weight cycle exists. - [Bellman-Ford Algorithm]

Question 8

Correct

Mark 1.00 out
of 1.00

Consider a weighted, directed acyclic graph $G = (V, E, w)$ in which edges that leave the source vertex s may have negative weights and all other edge weights are non-negative. Does Dijkstra's algorithm correctly compute the shortest-path weight $\delta(s, t)$ from s to every vertex t in this graph?

Select one:

- True ✓
- False

For the correctness of Dijkstra, it is sufficient to show that $d[v] = \delta(s, v)$ for every $v \in V$ when v is added to S . Given the shortest $s; v$ path and given that vertex u precedes v on that path, we need to verify that u is in S . If $u = s$, then certainly u is in S . For all other vertices, we have defined v to be the vertex not in S that is closest to s . Since $d[v] = d[u] + w(u, v)$ and $w(u, v) > 0$ for all edges except possibly those leaving the source, u must be in S since it is closer to s than v .

The correct answer is 'True'.



**Question 9**

Correct

Mark 1.00 out
of 1.00

Given a graph $G = (V,E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.

Select one:

- True ✓
 False

Both algorithms are guaranteed to produce the same shortest path weight, but if there are multiple shortest paths, Dijkstra's will choose the shortest path according to the greedy strategy, and Bellman-Ford will choose the shortest path depending on the order of relaxations, and the two shortest path trees may be different.

The correct answer is 'True'.

Question 10

Correct

Mark 1.00 out
of 1.00

A graph can have a negative weight cycle when?

Select one:

- a. The graph has 1 negative weighted edge
 b. The graph has a cycle
 c. The graph has 1 or more negative weighted edges
 d. The total weight of the graph is negative ✓

Your answer is correct.

When the total weight of the graph sums up to a negative number then the graph is said to have a negative weight cycle. Bellmann Ford Algorithm provides no solution for such graphs.

The correct answer is: The total weight of the graph is negative

PREVIOUS ACTIVITY

◀ Lecture Slides:
Single-Source Shortest
Path

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NEXT ACTIVITY

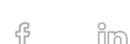
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Time taken 11 mins 5 secs

Grade 10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out
of 1.00

Dynamic Programming is often used for (choose all that apply)

Select one or more:

- a. Non-polynomial solution problems
- b. Optimization problems that involve making a choice that leave one or more subproblems to be solved ✓
- c. Problems previously solved using divide and conquer that have overlapping subproblems ✓
- d. Subproblems where resources are shared

Your answer is correct.

The correct answers are: Optimization problems that involve making a choice that leave one or more subproblems to be solved, Problems previously solved using divide and conquer that have overlapping subproblems

Question 2

Correct

Mark 1.00 out
of 1.00

What are 2 things required in order to successfully use the dynamic programming technique?

Select one:

- a. Optimal substructure and overlapping sub-problems ✓
- b. Divide and conquer
- c. A problem that can't be subdivided and is complex
- d. Non-overlapping subproblems and intervals
- e. Recursion and a problem that is complex

Your answer is correct.

The correct answer is: Optimal substructure and overlapping sub-problems

**Question 3**

Correct

Mark 1.00 out
of 1.00

The difference between Divide and Conquer and Dynamic Programming is:

Select one:

- a. Whether the subproblems overlap or not ✓
- b. The way we solve the base case
- c. The division of problems and combination of subproblems
- d. The depth of recurrence

Your answer is correct.

The correct answer is: Whether the subproblems overlap or not

Question 4

Correct

Mark 1.00 out
of 1.00

Dynamic programming does not work if the subproblems:

Select one:

- a. Overlap
- b. Have to be divided too many times to fit into memory
- c. Cannot be divided in half
- d. Share resources and thus are not independent ✓

Your answer is correct.

The correct answer is: Share resources and thus are not independent

Question 5

Correct

Mark 1.00 out
of 1.00

Every recurrence can be solved using the Master Theorem

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 6

Correct

Mark 1.00 out
of 1.00

When we are thinking about using dynamic programming, First step is to decide how to make some choice for a part of the problem, and then we have to figure out how to characterize the:

(Select the correct attribute)

Select one:

- a. Subproblems ✓
- b. Divide and conquer strategy
- c. Complexity of the algorithm
- d. Recursion equation

Your answer is correct.

The correct answer is: Subproblems



**Question 7**

Correct

Mark 1.00 out
of 1.00

Recurrence equations describing the work done during [recursion](#) are only useful for divide and conquer algorithm analysis

Select one:

- True
- False ✓

The correct answer is 'False'.

Question 8

Correct

Mark 1.00 out
of 1.00

A divide and conquer approach to solving a problem is useful when

Select one:

- a. The complexity is exponential to solve the entire problem
- b. None of the above
- c. The subproblems are overlapping so we don't have to solve them over and over again
- d. We can break the problem into several subproblems that are similar to the original problems but smaller in size ✓

Your answer is correct.

The correct answer is: We can break the problem into several subproblems that are similar to the original problems but smaller in size

Question 9

Correct

Mark 1.00 out
of 1.00

Assume we are solving the rod-cutting problem in the book using dynamic programming, and we have a rod of length n that we decide to cut at location

- i. How many subproblems are left after we make this cut
- ii. How many choices do we need to check for each subproblem?

We are trying to find the maximum profit from the rod lengths that we cut.

Select one:

- a. 3 subproblems, $n-1$ choices to check
- b. 1 subproblem, up to n choices we have to check ✓
- c. 2 subproblems, n choices we have to check
- d. No subproblems, we just solve the problem directly

Your answer is correct.

The correct answer is: 1 subproblem, up to n choices we have to check



Question 10

Correct

Mark 1.00 out
of 1.00

Select the problems with the technique that can best be used to solve them.

1. Matrix multiplication: Divide and Conquer ✓
2. Rod cutting: Dynamic Programming ✓
3. Quicksort: Divide and Conquer ✓
4. Interval scheduling: Greedy Strategy ✓

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