Evaluator

Results

Algorithm Analysis

$O_{(?)}$

Two Pointers

Binary Search

100%

67%

33%

Priority Queue/ Heap

Breadth First Search

Miscellaneous
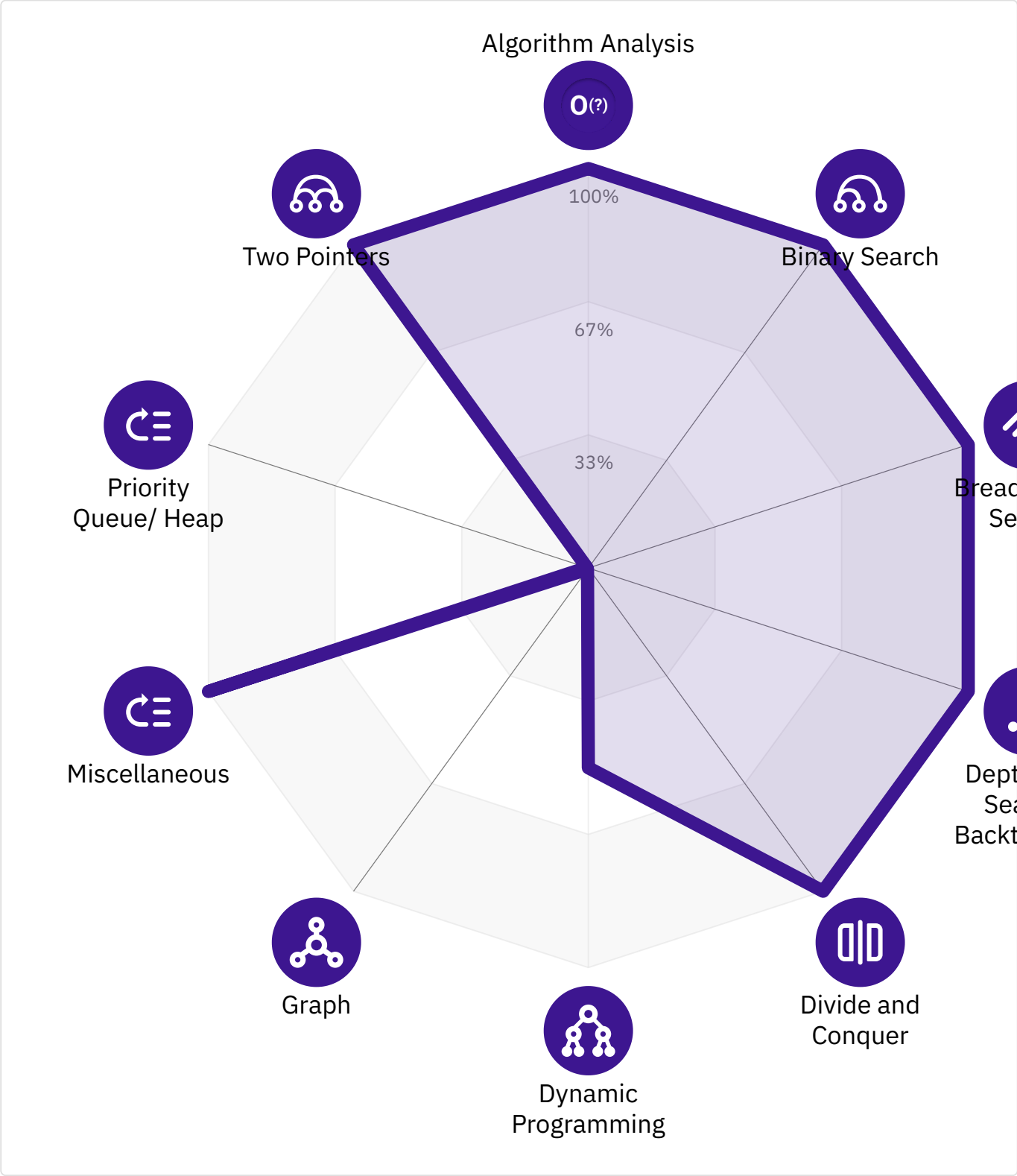
Depth First Search/ Backtracking

Graph

Divide and Conquer

Dynamic Programming

Question 1 out of 20

Which of the following is equvalent to O(3*2^n + n^3 + n!+ log n)?

Your Answer:

O(n!)

Correct Answer:

O(n!)

Only the dominating term matters, and the relationship is `n! > 2^n > n^3 > log n`. You can read our [Runtime Cheat Sheet](https://algo.monster/evaluator) to learn more.

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Question 2 out of 20

What is the running time of the following code?

```
1  int sqrt(int n) {
2    for (int guess = 1; guess * guess <= n; guess++) {
3      if (guess * guess == n) {
4        return guess;
5      }
6    }
7    return -1;
8  }
```

Your Answer:

O(sqrt(n))

Correct Answer:

O(sqrt(n))

The for loop has at most `sqrt n` rounds.

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Question 3 out of 20

What data structure does Breadth-first search typically uses to store intermediate states?

Your Answer:

Queue

Correct Answer:

Queue

Breadth-first search uses a queue and Depth-first search uses a stack.

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Question 4 out of 20

Which type of traversal does breadth first search do?

Your Answer:

Level-order traversal

Correct Answer:

Level-order traversal

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Question 5 out of 20

A person thinks of a number between 1 and 1000. You may ask any number questions to them, provided that the question can be answered with either "yes" or "no".

What is the minimum number of questions you needed to ask so that you are guaranteed to know the number that the person is thinking?

Your Answer:

10

Correct Answer:

10

A possible strategy is that each time, you divide the possible number into two distinct groups, and ask the question in a way so that you will know which group the answer belongs to. This way, you are guaranteed to know the answer within `ceil(log2(1000)) == 10` questions.

This is the basic principle of binary search.

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Question 6 out of 20

What is the best way of checking if an element exists in a sorted array once in terms of time complexity? Select the best that applies.

Your Answer:

Binary Search

Correct Answer:

Binary Search

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Question 7 out of 20

How many ways can you arrange the three letters A, B and C?

Your Answer:

6

Correct Answer:

6

The number of permutations between three letters is given by factorial of 3, ie. `3! = 3 × 2 × 1 = 6`. The permutations are: `ABC`, `ACB`, `BAC`, `BCA`, `CAB`, `CBA`.

We can list all the permutations using backtracking.

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Question 8 out of 20

What are the most two important steps in writing a depth first search function? (Select 2)

Your Answers:

Determine return value

Determine state to pass down to recursive function call

Correct Answers:

Determine return value

Determine state to pass down to recursive function call

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Question 9 out of 20

How does merge sort divide the problem into subproblems?

Your Answer:

Divide the array into two equal halves by index

Correct Answer:

Divide the array into two equal halves by index ✓

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Question 10 out of 20

How does quick sort divide the problem into subproblems?

Your Answer:

Divide the array into two based on whether an element is smaller than an arbitrary value

Correct Answer:

Divide the array into two based on whether an element is smaller than an arbitrary value

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Question 11 out of 20

What are the two properties the problem needs to have for dynamic programming to be applicable? (Select 2)

Your Answers:

Overlapping subproblems

Optimal substructure

Correct Answers:

Overlapping subproblems

Optimal substructure

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Question 12 out of 20

What is an advantages of top-down dynamic programming vs bottom-up dynamic programming?

Your Answer:

It's faster

Correct Answer:

Order of computer subproblems does not matter

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Question 13 out of 20

Depth first search can be used to find whether two components in a graph are connected.

Your Answer:

False

Correct Answer:

True

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Question 14 out of 20

Problem: Given a list of tasks and a list of requirements, compute a sequence of tasks that can be performed, such that we complete every task once while satisfying all the requirements.

Which of the following method should we use to solve this problem?

Your Answer:

I don't know

Correct Answer:

Topological Sort

You can read [our article](#) about Topological Sort.

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Question 15 out of 20

Given an array of 1,000,000 integers that is almost sorted, except for 2 pairs of integers. Which algorithm is fastest for sorting the array?

Your Answer:

Insertion sort

Correct Answer:

Insertion sort

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Question 16 out of 20

How would you design a stack which has a function `min` that returns the minimum element in the stack, in addition to `push` and `pop`? All `push`, `pop`, `min` should have running time `O(1)`.

Your Answer:

Add another stack to store the minimums

Correct Answer:

Add another stack to store the minimums

The minimum of the stack only changes when a smaller value is pushed or the minimum is poped, so we can use another stack to store the minimums.

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Question 17 out of 20

In a binary min heap, the minimum element can be found in:

Your Answer:

O(N)

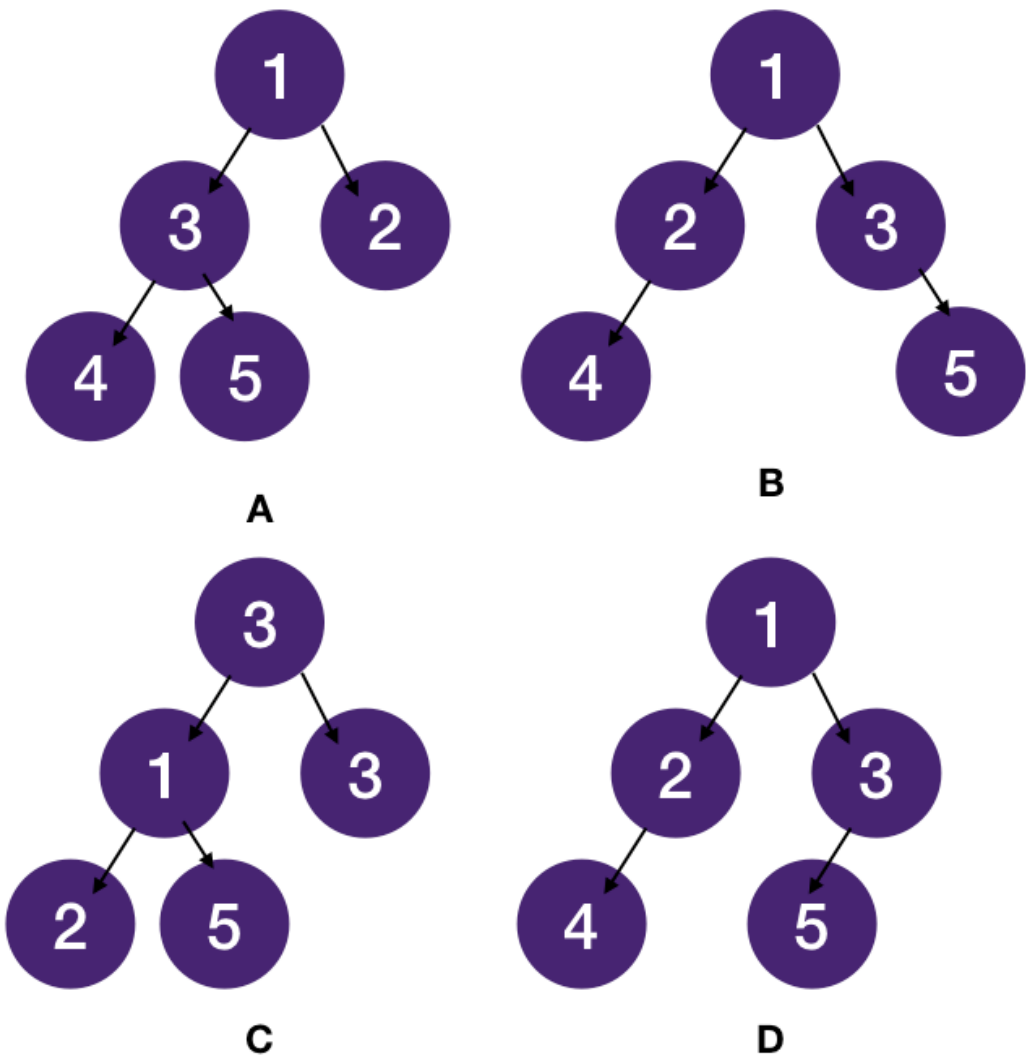Correct Answer:

O(1)

Question 18 out of 20

Which of the following is a min heap?

Your Answer:

D

Correct Answer:

A

A min heap an almost complete tree with the properties that 1) each level except last one is filled and last level is left-justified and 2) each node's value is larger than its parent's value. B and D violates 1). C violates 2).

Question 19 out of 20

Which technique can we use to find the middle of a linked list?

Your Answer:

Fast-slow pointers

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Correct Answer:

Fast-slow pointers

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Question 20 out of 20

Which of the following is the prefix sum of array `[1, 2, 3, 4, 5]`?

Your Answer:

[1, 3, 6, 10, 15]

Correct Answer:

[1, 3, 6, 10, 15]

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