Final Exam

Due Apr 26 at 11:59pm **Points** 30 **Questions** 30
Available Apr 24 at 12:01am - May 3 at 11:59pm **Time Limit** 60 Minutes

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	59 minutes	21 out of 30

ⓘ Correct answers will be available Apr 29 at 12:01am - Apr 30 at 11:59pm.

Score for this quiz: **21** out of 30
Submitted Apr 26 at 11:13pm
This attempt took 59 minutes.

Question 1

1 / 1 pts

A graph having an edge from each vertex to every other vertex is a graph of which of the following types?

- Loosely connected
- Fairly connected
- None of these

Tightly connected

Question 2

1 / 1 pts

A robot is located at the top-left corner of a 3 x 7 grid (marked 'Start' in the diagram below). The robot can only move either down or right at any point in time. The robot is trying to reach the bottom-right corner of the grid (marked 'Finish' in the diagram below).

How many possible unique paths are there?

- 21
- 25
- 28
- 30

Question 3

1 / 1 pts

A subsequence **is a sequence that can be derived from another sequence by deleting 0 or more elements without changing the order of the remaining elements. Given an unsorted array of integers [5,3,7,18,10,9,2,10], what is the length of longest increasing subsequence?**

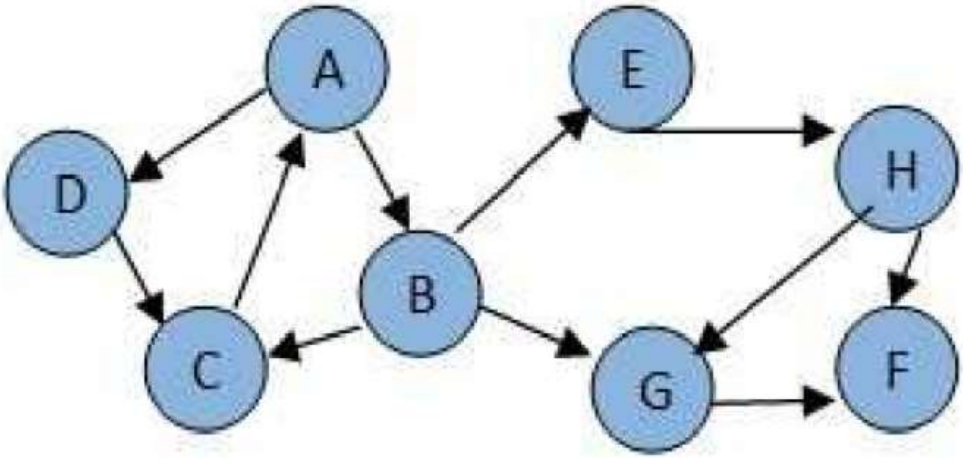
- (●) 4
- ( ) 5
- ( ) 6
- ( ) 3

Incorrect

Question 4

0 / 1 pts

Consider the graph below. If there is ever a decision between multiple neighbor nodes in the BFS or DFS algorithms, assume we always choose the letter closest to the beginning of the alphabet first.



In what order will the nodes be visited using a Breadth First Search?

- ( ) **ABCEHFGD**
- ( ) **ABDCGEHF**

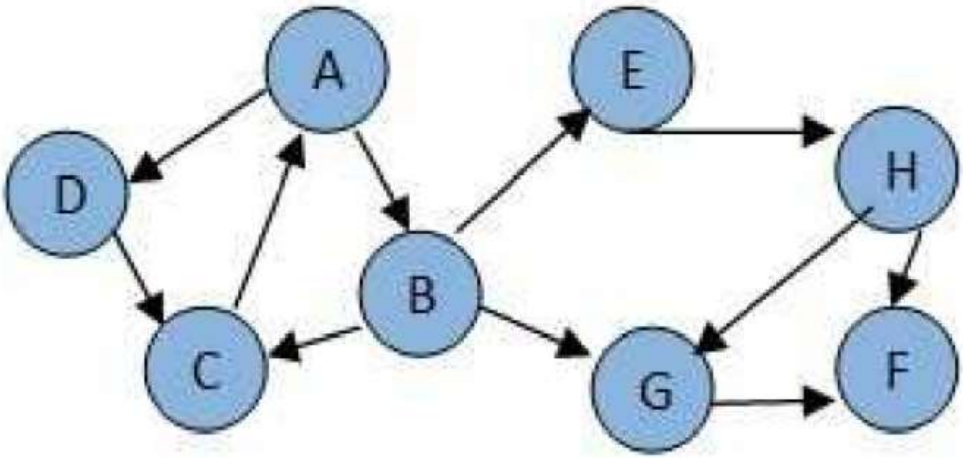
- **ABCDEFGH**
- ABDCEGHF

Incorrect

Question 5

0 / 1 pts

Consider the graph below. If there is ever a decision between multiple neighbor nodes in the BFS or DFS algorithms, assume we always choose the letter closest to the beginning of the alphabet first.



In what order will the nodes be visited using a Depth First Search?

- ABDCEGHF
- **ABDCGEHF**
- ABCEHFGD
- ABCDEFGH

Question 6

1 / 1 pts

Dijkstra’s Algorithm finds the shortest path between two nodes in a graph, G = (V,E). With which of the following constraints must the set of edges, E, comply in order for Dijkstra's algorithm to work properly?

- All weights are non-negative
- All weights are negative.
- Weights can be positive or negative.
- None of the other options is correct.

Question 7

1 / 1 pts

Given a graph, G = (V, E). The time complexity of the DFS algorithm is which of the following?

- O (V + E)

O (E)

O (V)

O (V * E)

Incorrect

Question 8

0 / 1 pts

Given an array of non-negative integers [2,3,1,4,2,3], you are initially positioned at the first index of the array. Each element in the array represents your maximum jump length at that position. What is minimum number of jumps to the last index of the array.

5

4

3

2

Question 9

1 / 1 pts

Given an integer array [-1, 2, 3, -4, 5, -1, 7], which of the following equals the largest sum in any contiguous subarray of this array (containing at least one number)?

12

- 11
- 17
- 7

Question 10

1 / 1 pts

Given the following recursive function:

```
int recursive (int n) {
  if (n == 1)
 return (1);
 else
 return (recursive (n-1) + recursive (n-1));
}
```

What is the time complexity of this function?

- (selected) O(2^n)
- O(nlogn)
- O(n*n)
- O(n)

Incorrect

Question 11

0 / 1 pts

If T(n) = T(n-2) + n*n, then

T(n) = Θ(n*n*n)

T(n) = Θ(n*n)

T(n) = Θ(n*n*log n)

T(n) = Θ(n log n)

Question 12

1 / 1 pts

If f = O(g) and g = O(h), then according to the transitivity property, which of the following denote an asymptotic upper bound for f?

O(h)

O(g)

O(f)

None of these

Question 13

1 / 1 pts

In dynamic programming, which of the following is the name for the technique for storing previously calculated values in an intermediate storage facility in order to improve performance?

- Storing value property
- Mapping
- Memoization
- Saving value property

Question 14

1 / 1 pts

Student s is a 'valid partner' for hospital h if there exists any _____ in which h and s are matched.

- Unstable Matching
- Proper Matching

Stable Matching

Improper Matching

Incorrect

Question 15

0 / 1 pts

Suppose T is a binary tree with 14 nodes. What is the minimum possible depth of T?

2

3

5

4

Incorrect

Question 16

0 / 1 pts

Suppose you have a game that consists of tossing a fair coin 5 times, successively. What is the number of vertices of a state graph that models this process?

7

25

64

63

Question 17

1 / 1 pts

The following algorithms - merge sort, quick sort and binary search - are based on which of the following approaches?

- Dynamic programming
- Greedy algorithm
- Hashing
- Divide and conquer algorithm

Question 18

1 / 1 pts

The state in which “everyone is matched one-to-one” is called which of the following?

- Perfect Matching

Imperfect Matching

Improper Matching

Proper Matching

Incorrect

Question 19

0 / 1 pts

The worst case running time for building a binary search tree is which of the following?

- O(nlogn)
- O(n*nlogn)
- O(n*n)
- O(n)

Question 20

1 / 1 pts

The “Propose-and-Reject” algorithm is another name for which the algorithms listed below?

Dijkstra’s algorithm

Ford-Fulkerson algorithm

Gale-Shapley algorithm

Prim's algorithm

Question 21

1 / 1 pts

What is the maximum number of edges present in a simple directed graph with 7 vertices if there exists no cycles in the graph?

14

6

7

8

Question 22

1 / 1 pts

What is the worst-case time for quicksort to sort an array of n elements?

- O(n log n)
- O(n)
- O(logn)
- O(n * n)

Question 23

1 / 1 pts

Which of the following are required of a problem so that dynamic programming would be an effective approach?

i) polynomial number of subproblems

II) cubic time formulation of overall solution from solutions to subproblems

III) progression of subproblems from smallest to largest

- **I and III only**
- **I only.**
- **I, II, and III**
- **II only**

Question 24

1 / 1 pts

Which of the following is the time complexity for the Insertion sort algorithm?

- Logarithmic time
- Exponential time
- Linear time
- Quadratic time

Question 25

1 / 1 pts

Which of the following problems is a strong candidate for solving using dynamic programming?

- Binary search
- Quicksort
- **Knapsack Problem**
- Mergesort

Question 26

1 / 1 pts

Which of the following types of bounds does the Theta ‘Θ’ notation indicate?

- Tight bound (selected)
- Upper bound
- Lower bound
- Loose bound

Incorrect

Question 27

0 / 1 pts

Suppose the preferences in a stable matching problem are:

A:M>ME.

R:ME>M.

ME:A>R.

M:R>A.

Claim: The match, A:M and R:ME, is stable and there is no other stable matching.

- (●) True
- ( ) False

Question 28

1 / 1 pts

Suppose we have two arrays of size N. Our goal is to find two numbers that add up to a particular value. The optimal way this can be done is by doing N * N searches for finding the required sum pair. There is no limitation on data structure usage for solving these.

- ( ) True
- (●) False

Incorrect

Question 29

0 / 1 pts

Give a tight asymptotic upper bound (Big-O notation) for the time complexity of the following recurrences:

$T(n)=T(n/3)+T(n/4)+5n$

- (●) None of these option is correct.
- ( ) O(n^(1/2))
- ( ) O(n^(1/3))
- ( ) O(n)

Question 30

1 / 1 pts

In the subset sums problem, we can use a dynamic programming approach in which we use a 2-dimensional array, M[i,w], where 0 <= i <= n and 0 <= w <= W. Assuming that w(i) < W, where w(i) is the weight for the i-th item, which of the following expressions can be used to determine M[i,w]?

- max(M[i-1,w], w(i) + M[i-1,w(i)-w(i-1)])
- max(M[i-1,w], w(i) + M[i-1,w-w(i)]) (selected)
- max(M[i-1,w], w(i) + M[i-1,w])
- max(M[i,w-w(i)], w(i) + M[i-1,w-w(i)])

Quiz Score: **21** out of 30