3.Which of the following statements about Euclid's algorithm is true? 1/1

- It works only for prime numbers.
- It can be used to find the GCD of any two positive integers. ✓
- It involves complex numbers.
- It can only find the GCD of small numbers.

4.If the inputs to Euclid's algorithm are 24 and 60, what is the GCD? 1/1

- 4
- 12 ✓
- 20
- 36

5.Euclid's algorithm relies on the fact that the GCD of two numbers remains the same when: 1/1

- They are multiplied by a constant.
- They are divided by each other and the remainder is considered. ✓
- They are added together.
- They are raised to a power.

6.What is the base case for Euclid's algorithm? 1/1

- When both numbers are equal.
- When one of the numbers is zero. ✓
- When one of the numbers is zero. ✓
- When the numbers are prime.

1.What is Euclid's algorithm used for? 1/1

- Finding prime numbers
- Finding the greatest common divisor (GCD) of two numbers ✓
- Calculating logarithms
- Solving quadratic equations

2.Euclid's algorithm is based on which mathematical concept? 1/1

- Division ✓
- Addition
- Multiplication
- Subtraction

9.Euclid's algorithm is an example of a: 1/1

- Sorting algorithm.
- Recursive algorithm. ✓
- Matrix algorithm.
- Iterative algorithm.

10.What is the time complexity of Euclid's algorithm? 0/1

- O(log n) ✗
- O(log(min(a, b)))
- O(n)
- O(a + b)

Correct answer

- O(log(min(a, b)))

- 1 ✗
- -1
- 6
- 20

Correct answer

- -1

✗ 8.In each iteration of Euclid's algorithm, which number is replaced with the remainder? 0/1

- The larger number. ✗
- The smaller number.
- The sum of the numbers.
- The difference of the numbers.

Correct answer

- The smaller number.

✗ 3) What is the maximum sum of an hourglass in a matrix? 0/1

- A) The sum of all the values in the matrix
- B) The sum of all the values in the middle row of the matrix ✗
- C) The sum of all the values in the middle column of the matrix
- D) The sum of all the values in every hourglass in the matrix

Correct answer

- D) The sum of all the values in every hourglass in the matrix

✗ 4) What is the space complexity of finding the maximum sum of an hourglass in a matrix using brute force? 0/1

- A) O(1)
- B) O(n)
- C) O(n^2)
- D) O(n^3) ✗

Correct answer

- A) O(1)

✗ 5)What is the best way to find the maximum sum of an hourglass in a matrix? 0/1

- ○ A) Brute force
- ○ B) Dynamic programming
- ○ C) Sorting
- ◉ D) Randomized algorithms ✗

Correct answer

- ◉ B) Dynamic programming

✗ 6)Which of the following algorithms can be used to find the maximum sum of an hourglass in a matrix? 0/1

- ○ A) Kadane's algorithm
- ○ B) Dijkstra's algorithm
- ◉ C) Bellman-Ford algorithm ✗
- ○ D) Kruskal's algorithm

Correct answer

- ◉ A) Kadane's algorithm

✗ 1) What is an hourglass in a matrix? 0/1

- A) A subset of values that form a 3x3 pattern
- B) A subset of values that form a 4x4 pattern ✗
- C) A subset of values that form a 2x2 pattern
- D) A subset of values that form a 5x5 pattern

Correct answer

- A) A subset of values that form a 3x3 pattern

✓ 2) How many values form an hourglass in a matrix? 1/1

- A) 4
- B) 6
- C) 8
- D) 7 ✓

✗ 9) What is the difference between an hourglass and a submatrix in a matrix? 0/1

- ○ A) An hourglass has a diamond shape, while a submatrix can have any shape
- ◉ B) An hourglass has nine values, while a submatrix can have any number of values ✗
- ○ C) An hourglass is a specific type of submatrix that has a 3x3 shape
- ○ D) There is no difference

Correct answer

- ◉ C) An hourglass is a specific type of submatrix that has a 3x3 shape

✗ 10) How can you access an element in a two-dimensional array in Java? 0/1

- ○ A) Using a single index
- ○ B) Using two indices
- ○ C) Using a HashMap
- ◉ D) Using a LinkedList ✗

Correct answer

- ◉ B) Using two indices

✓ 1.What is the Karatsuba algorithm used for? 1/1

- ○ Sorting arrays
- ○ Matrix multiplication
- ○ Exponentiation
- ◉ Fast integer multiplication ✓

✓ 2. Who developed the Karatsuba algorithm? 1/1

- ○ John von Neumann
- ○ Donald Knuth
- ◉ Anatolii Alexeevitch Karatsuba ✓
- ○ Edsger Dijkstra

Correct answer

◉ A) Kadane's algorithm

✕ 7) Which of the following is an advantage of using Kadane's algorithm to find the maximum sum of an hourglass in a matrix? 0/1

○ A) It is faster than brute force

◉ B) It has lower space complexity than brute force ✕

○ C) It can handle matrices of any size

○ D) All of the above

Correct answer

◉ D) All of the above

✕ 8)Which of the following is a disadvantage of using Kadane's algorithm to find the maximum sum of an hourglass in a matrix? 0/1

○ A) It may not work for some matrices

◉ B) It is more complex than brute force ✕

○ C) It requires more memory than brute force

○ D) None of the above

Correct answer

◉ A) It may not work for some matrices

5. What is the key idea behind the Karatsuba algorithm? 1/1

- [x] Divide and conquer
- [ ] Dynamic programming
- [ ] Randomized algorithms
- [ ] Bit manipulation

6. Which step of the Karatsuba algorithm involves recursive calls? 1/1

- [ ] Addition of partial products
- [ ] Multiplication of the high-order halves
- [x] Multiplication of the low-order halves
- [ ] Combination of the partial results

7. Which of the following is NOT a benefit of the Karatsuba algorithm? 1/1

- Improved speed for large numbers
- Reduced number of multiplications
- Reduced memory usage
- Improved accuracy ✓

8. Which of the following is NOT a requirement for using the Karatsuba algorithm? 1/1

- The numbers must be positive
- The numbers must have the same number of digits
- The numbers must be in binary representation ✓
- The numbers must be of equal length or differ by at most one

3. Which mathematical operation does the Karatsuba algorithm optimize? 1/1

- Addition
- Subtraction
- Multiplication ✓
- Division

4. In the Karatsuba algorithm, how are large numbers divided? 0/1

- Into individual digits ✗
- Into binary digits
- Into blocks of equal size
- Into prime factors

Correct answer

- Into binary digits

Karatsuba algorithm?

- (●) Toom-Cook multiplication ✓
- ( ) Quicksort
- ( ) Dijkstra's algorithm
- ( ) Merge sort

✗ 10.In which scenario would the Karatsuba algorithm be most beneficial? 0/1

- (●) Multiplying small numbers ✗
- ( ) Multiplying large prime numbers
- ( ) Multiplying numbers with highly varying lengths
- ( ) Multiplying numbers with many trailing zeros

Correct answer

- (●) Multiplying numbers with highly varying lengths

✗ 1. What is the Block Swap Algorithm used for? 0/1

- (●) A) Sorting a list of numbers in ascending order ✗
- ( ) B) Reversing the order of elements in an array
- ( ) C) Shuffling the elements of an array randomly
- ( ) D) Finding the maximum element in an array

Correct answer

- (●) B) Reversing the order of elements in an array

✓ 2.How does the Block Swap Algorithm work? 1/1

- ( ) A) It selects a pivot element and partitions the array into two parts
- (●) B) It swaps two blocks of elements within an array ✓
- ( ) C) It compares adjacent elements and swaps them if they are in the wrong order
- ( ) D) It recursively divides the array into smaller subarrays and merges them back in order

✗ 3.What is the time complexity of the Block Swap Algorithm? 0/1

- (●) A) O(1) ✗
- ( ) B) O(log n)
- ( ) C) O(n)
- ( ) D) O(n^2)

Correct answer

- (●) C) O(n)

✗ 4. How many elements are swapped in each iteration of the Block Swap Algorithm 0/1

- ( ) A) One element

✗ 4. How many elements are swapped in each iteration of the Block Swap Algorithm 0/1

- A) One element
- B) Two elements ✗
- C) A block of elements
- D) All elements in the array

Correct answer

- C) A block of elements

✓ 5. What is the significance of the block size in the Block Swap Algorithm? 1/1

- A) It determines the number of iterations required to reverse the array
- B) It affects the space complexity of the algorithm
- C) It determines the maximum number of elements that can be reversed at once ✓
- D) It has no impact on the algorithm's performance

✓ 6. In the Block Swap Algorithm, what happens if the block size is larger than the array size? 1/1

- A) The algorithm fails and produces incorrect results
- B) The algorithm adjusts the block size to match the array size
- C) The algorithm ignores the excess elements beyond the array size ✓
- D) The algorithm terminates with an error message

✗ 7. Which of the following statements about the Block Swap Algorithm is true? 0/1

- A) It requires additional auxiliary space to store intermediate results
- B) It is a comparison-based sorting algorithm ✗
- C) It works only on arrays with even lengths
- D) It is an in-place algorithm that operates directly on the input array

Correct answer

- D) It is an in-place algorithm that operates directly on the input array

✓ 8. What is the minimum number of iterations required to reverse an array using the 1/1

✓ 9.Which of the following statements is true regarding the longest sequence of 1's after flipping a bit? 1/1

- ○ Flipping any bit in a sequence of 1's will always increase the length of the sequence.
- ◉ Flipping any bit in a sequence of 1's may increase or decrease the length of the sequence. ✓
- ○ Flipping any bit in a sequence of 1's will always decrease the length of the sequence.
- ○ Flipping any bit in a sequence of 1's has no effect on the length of the sequence.

✗ 10.What is the maximum possible length of a sequence of 1's after flipping exactly one bit in a binary sequence of length N? 0/1

- ◉ N-1 ✗
- ○ N
- ○ N+1
- ○ N+2

Correct answer

- ◉ N+1

✗ 5.Which of the following data structures can be used to efficiently solve the maximum product subarray problem? 0/1

- a) Array
- b) Stack
- c) Queue ✗
- d) Binary Tree

Correct answer

- b) Stack

✗ 6.What is the maximum product of a subarray in the array [1 5 -7 5 3] 0/1

- a) 6
- b) 0 ✗
- c) -35
- d) 15

Correct answer

- d) 15

✓ 3. What is the time complexity of the efficient algorithm for solving the maximum product subarray problem? 1/1

- (●) a) O(n) ✓
- ( ) b) O(n^2)
- ( ) c) O(log n)
- ( ) d) O(2^n)

✗ 4.Which of the following is not a correct approach to solve the maximum product subarray problem? 0/1

- ( ) a) Using a brute-force approach
- ( ) b) Using Kadane's algorithm
- (●) c) Using a sliding window technique ✗
- ( ) d) Using the Fibonacci sequence

Correct answer

- (●) d) Using the Fibonacci sequence

✓ 8. What is the minimum number of iterations required to reverse an array using the Block Swap Algorithm? 1/1

- A) 1
- B) 2 ✓
- C) 3
- D) It depends on the size of the array

✓ 9. Can the Block Swap Algorithm be used to reverse a subarray within an array? 1/1

- A) Yes, by specifying the start and end indices of the subarray ✓
- B) No, the algorithm can only reverse the entire array
- C) It depends on the elements present in the subarray
- D) It depends on the programming language used

✗ 10. Which of the following is a potential drawback of the Block Swap Algorithm? 0/1

- A) It has a high space complexity ✗
- B) It is not suitable for large arrays
- C) It requires prior knowledge of the array's structure
- D) It has a time complexity of O(n^2)

Correct answer

- B) It is not suitable for large arrays

✗ 8.In the maximum product subarray problem, if the array contains only positive numbers, what will be the maximum product? 0/1

- a) The product of all elements in the array
- b) Zero
- c) The maximum element in the array ✗
- d) One

Correct answer

- a) The product of all elements in the array

✗ 9. Which of the following is an efficient approach to solve the maximum product subarray problem when all elements are non-negative? 0/1

- a) Brute-force algorithm

✓ 1.What is the maximum product subarray problem? 1/1

- a) Finding the largest sum of a contiguous subarray
- b) Finding the smallest product of a contiguous subarray
- c) Finding the largest product of a contiguous subarray ✓
- d) Finding the smallest sum of a contiguous subarray

✓ 2. Which algorithm can be used to solve the maximum product subarray problem efficiently? 1/1

- a) Depth-First Search (DFS)
- b) Breadth-First Search (BFS)
- c) Dynamic Programming (DP) ✓
- d) Binary Search

the array

✗ 9. Which of the following is an efficient approach to solve the maximum product subarray problem when all elements are non-negative? 0/1

- a) Brute-force algorithm
- b) Kadane's algorithm
- c) Sliding window algorithm ✗
- d) Dynamic Programming algorithm

Correct answer

- b) Kadane's algorithm

✗ 10. What is the maximum product of a subarray in the array [-1,2,-2,4,3,2,-1]? 0/1

- a)24
- b)2

structures can be used to efficiently solve the maximum product subarray problem?

- a) Array
- b) Stack
- c) Queue ✗
- d) Binary Tree

Correct answer

- b) Stack

✗ 6.What is the maximum product of a subarray in the array [1 5 -7 5 3] 0/1

- a) 6
- b) 0 ✗
- c) -35
- d) 15

Correct answer

b) Kadane's algorithm

c) Sliding window algorithm ✗

d) Dynamic Programming algorithm

Correct answer

b) Kadane's algorithm

✗ 10. What is the maximum product of a subarray in the array [-1,2,-2,4,3,2,-1]? 0/1

a)24

b)2

c)89 ✗

d)34

Correct answer

a)24

✓ 1. What is the maximum length of the longest sequence of 1's that can be achieved by flipping one bit in the binary sequence "110111011"? 1/1

- ○ 3
- ◉ 4 ✓
- ○ 5
- ○ 6

✗ 2.what is the time complexity of longest sequence of 1's after flipping a bit 0/1

- ○ o(n)
- ○ o(n*n)
- ◉ o(log n) ✗
- ○ o(log(log n))

Correct answer

- ◉ o(n)

✗ 3. What is the maximum length of the longest sequence of 1's that can be achieved by flipping one bit in the binary sequence "10011110010"? 0/1

- ○ 3
- ○ 4
- ◉ 5 ✗
- ○ 6

Correct answer

- ◉ 6

✗ 4. What is the maximum length of the longest sequence of 1's that can be achieved by flipping one bit in the binary sequence "11111100010"? 0/1

- ○ 5
- ◉ 6 ✗
- ○ 7
- ○ 8

Correct answer

- ◉ 7

Correct answer

d) 15

✗ 7.What is the maximum product of a subarray in the array [2, 3, -2, 4,1]? 0/1

a) 6

b) 8

c) 12 ✗

d) 16

Correct answer

a) 6

✗ 8.In the maximum product subarray problem, if the array contains only positive numbers, what will be the maximum product? 0/1

✗ 7.What is the maximum length of the longest sequence of 1's that can be achieved by flipping one bit in the binary sequence "1100101101100010"? 0/1

- ○ 10
- ◉ 9 ✗
- ○ 8
- ○ 7

Correct answer

- ◉ 7

✗ 8.In computer science, what is the term used to describe the process of changing a 0 to a 1 or vice versa? 0/1

- ○ Flipping
- ○ Toggling
- ○ Inverting
- ◉ Reversing ✗

Correct answer

- ◉ Flipping

7

✗ 5. what is the space complexity of longest sequence of 1's after flipping a bit 0/1

- o(n)
- o(1)
- o(2)
- o(n*n) ✗

Correct answer

- o(n)

✓ 6.What is the maximum length of the longest sequence of 1's that can be achieved by flipping one bit in the binary sequence "10100011110"? 1/1

- 3
- 4
- 5 ✓
- 6