Unit 2 - Week 0

Assignment 0

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-01-27, 23:59 IST.

1) 34 as a binary string is *1 point*

- (a) 100010
- (b) 110001
- (c) 100001
- (d) 100011

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) 100010

2) Arranging the data items in some order is called *1 point*

- (a) insertion
- (b) deletion
- (c) sorting
- (d) push

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c) sorting

3) When operators are written in-between their operands, they are known as *1 point*

- (a) Infix notation
- (b) Polish notation
- (c) There exist no such operators
- (d) Reverse Polish notation

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) Infix notation

4) Which of the following operations can be performed on data structures *1 point*

- (a) insertion
- (b) deletion
- (c) search
- (d) all of the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) all of the above

5) Consider that a problem has specified a desired input/output relation- ship, then a specific computational procedure for achieving that in- put/output relationship is called *1 point*

- (a) Data structure
- (b) Algorithm
- (c) Memory allocation
- (d) Array

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) Algorithm

6) Consider the following statement "All algorithms gives correct output for every input instance". This statement is *1 point*

- (a) True
- (b) False

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) False

7) The hexadecimal representation of the decimal number 101 is *1 point*

- (a) 66
- (b) 65
- (c) 64
- (d) 63

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) 65

8) The ASCII value of A in decimal is *1 point*

- (a) 65
- (b) 66
- (c) 67
- (d) 68

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) 65

9) Which of the following is NOT a linear data structure *1 point*

- (a) Array
- (b) Linked List
- (c) Stacks
- (d) Trees

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) Trees

10) Which of the following is/are real-time applications of Data Structures. *1 point*

- (a) representing a city region telephone network
- (b) implement back functionality in the internet web browser
- (c) Neither a nor b
- (d) Both a and b

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d) Both a and b

Unit 3 - Week 1

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1) In Insertion sort, for the array [34, 8, 64, 51, 32, 21] , how will the array elements look like after second iteration — 1 point

(a) 8, 21, 32, 34, 51, 64
(b) 8, 32, 34, 51, 64, 21
(c) 8, 34, 51, 64, 32, 21
(d) 8, 34, 64, 51, 32, 21

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) Consider the following functions — 1 point

$$f(n) = 3n\sqrt{n}$$
$$g(n) = 2^{\sqrt{n}\log_2 n}$$
$$h(n) = n!$$

Which of the following is true?

(a) $h(n)$ is $\mathcal{O}(f(n))$
(b) $h(n)$ is $\mathcal{O}(g(n))$
(c) $g(n) \neq \mathcal{O}(f(n))$
(d) $f(n)$ is $\mathcal{O}(g(n))$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

3) "Insertion sort is an example of an *incremental* algorithm". This statement is: — 1 point

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

4) Consider the following two statements — 1 point
Statement 1: In insertion sort, after m passes through the array, the first m elements are in sorted order.
Statement 2: And these elements are the m smallest elements in the array.
Then

(a) Both the statements are true
(b) Statement 1 is true but statement 2 is false
(c) Statement 1 is false but statement 2 is true
(d) Both the statements are false

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) What is the average case time complexity of merge sort? — 1 point

(a) $\mathcal{O}$(nlogn)
(b) $\mathcal{O}(n^2)$
(c) $\mathcal{O}(n^2\log$ n)
(d) $\mathcal{O}(n(logn)^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) Consider an array of elements 5, 4, 3, 2, 1 , what are the steps of insertions done while doing insertion sort in the array. — 1 point

(a) (45321) → (34521) → (23451) → (12345)
(b) (54312) → (54123) → (51234) → (12345)
(c) (43215) → (32154) → (21543) → (15432)
(d) (45321) → (23451) → (34521) → (12345)

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7) How many iteration on an array of size N, does an insertion sort algorithm consist of? — 1 point

(a) N
(b) $N-1$
(c) $N+1$
(d) N^2

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) What is the average case running time of an insertion sort algorithm? — 1 point

(a) $\mathcal{O}(N)$
(b) $\mathcal{O}(NlogN)$
(c) $\mathcal{O}(logN)$
(d) $\mathcal{O}(N^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

9) Which of the following is correct with regard to insertion sort? — 1 point

(a) insertion sort is stable and it sorts In-place
(b) insertion sort is unstable and it sorts In-place
(c) insertion sort is stable and it does not sort In-place
(d) insertion sort is unstable and it does not sort In-place

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

10) Assume that a merge sort algorithm in the worst case takes 30 seconds for an input of size 64. Which of the following most closely approximates the maximum input size of a problem that can be solved in 6 minutes? — 1 point

(a) 256
(b) 512
(c) 1024
(d) 2048

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

Unit 4 - Week 2

Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

Choose the most appropriate option.

1) Solve the following recurrence using Masters theorem, $T(n) = 0.7T(\frac{n}{2}) + \frac{1}{n}$ — 1 point

(a) $T(n) = \mathcal{O}(n)$

(b) $T(n) = \mathcal{O}(logn)$

(c) $T(n) = \mathcal{O}(n^2 logn)$

(d) cannot be solved using masters theorem

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) Solve the recurrence by master method — 1 point

$$T(n) = T(\sqrt{n}) + 1$$

(a) $T(n) = \Theta(loglogn)$

(b) $T(n) = \Theta(logn)$

(c) $T(n) = \Theta(\sqrt{n})$

(d) None of these.

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

3) 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 number and n can be any positive integer. What can be the best possible time complexity of your power function? — 1 point

(a) $\mathcal{O}(n)$
(b) $\mathcal{O}(nlogn)$
(c) $\mathcal{O}(loglogn)$
(d) $\mathcal{O}(logn)$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

4) Under what case of Masters theorem will the recurrence relation of merge sort fall? — 1 point

(a) 1^{st} case
(b) 2^{nd} case
(c) 3^{rd} case
(d) It cannot be solved using masters theorem

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Which of the following is not an advantage of Fibonacci Search? — 1 point

(a) When the element being searched for has a non uniform access storage

(b) Can be used in magnetic tapes

(c) Can be used for large arrays which do not fit in the CPU cache or in the RAM

(d) It can be applied efficiently on unsorted arrays

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

6) Which of the following are the steps for Divide and Conquer method? — 1 point

(a) only Divide and Conquer

(b) only divide and combine

(c) only combine and conquer

(d) all divide, conquer and combine

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

7) Navie matrix multiplication of two $n \times n$ matrices have running time — 1 point

(a) $\theta(n)$
(b) $\theta(n^2)$
(c) $\theta(n^3)$
(d) $\theta(1)$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

8) If $T(n) = T(n/4) + T(n/2) + n^2$,then using recursion tree method — 1 point

(a) $T(n) = \theta(n)$.
(b) $T(n) = \theta(n^2)$.
(c) $T(N) = \theta(n^3)$.
(d) None of the above

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

9) Recurrence relation for binary search — 1 point

(a) $T(n) = 2T(n/2) + \theta(1)$
(b) $T(n) = T(n/2) + \theta(1)$
(c) $T(n) = 2T(n/2) + \theta(n)$
(d) $T(n) = 2T(n/2) + \theta(n^2)$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

10) Strassens algorithm needs ..... many multiplications to multiply two (2×2) matrices — 1 point

(a) 8
(b) 9
(c) 7
(d) 3

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

Unit 5 - Week 3

Assignment 3

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-19, 23:59 IST.

1) The best case behaviour occurs for quick sort is, if partition splits the array of size n into *1 point*

(a) $n/2 : (n/2) - 1$
(b) $n/2 : n/3$
(c) $n/4 : 3n/2$
(d) $n/4 : 3n/4$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

2) Consider the Quick sort algorithm which sorts elements in ascending order using the first element as pivot. Then which of the following input sequence will require a maximum number of comparisons when this algorithm is applied on it? *1 point*

(a) 22 25 56 67 89
(b) 52 25 76 67 89
(c) 22 25 76 67 50
(d) 52 25 89 67 76

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

3) Which of the following represents the max heap property? *1 point*

(a) Value of left child > Value of right child
(b) Value of children > Value of parents
(c) Value of parent > Value of children
(d) Value of right child > Value of left child

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

4) While sorting the numbers (70, 48, 76, 58, 43, 47, 78, 53) using quicksort, the last number is chosen as pivot, what will be the permutation of the numbers after partition function has been applied? *1 point*

(a) 48 43 47 53 70 76 78 58
(b) 43 47 48 53 58 70 76 78
(c) 48 47 43 53 70 78 76 58
(d) 47 48 43 53 78 76 70 58

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

5) What is the best case time complexity of quicksort? *1 point*

(a) $\theta(n.logn)$
(b) $\theta(n^2)$
(c) $\theta(n)$
(d) $\theta(1)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) What is the height of a binary heap? *1 point*

(a) $\mathcal{O}(n)$
(b) $\mathcal{O}(nlogn)$
(c) $\mathcal{O}(logn)$
(d) $\mathcal{O}(n^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

7) What is the recurrence relation of the best case in quicksort? *1 point*

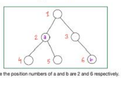
(a) $T(n) = T(n-1) + \theta(n)$
(b) $T(n) = 2T(n/2) + \theta(n)$
(c) $T(n) = T(n/2) + \theta(n^2)$
(d) $T(n) = 2T(n/2) + \theta(n^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) Max heap is built using the numbers (12, 1, 4, 8, 6, 13, 9, 3). Assuming the first position number to be 1, what will be the new position numbers of 12 and 6 respectively, after the max heap is built? *1 point*

(a) 3, 5
(b) 3, 4
(c) 3, 6
(d) 2, 6



Here the position numbers of a and b are 2 and 6 respectively.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) Which of the following algorithms is better when dealing with reverse sorted numbers? *1 point*

(a) Quicksort
(b) Heap sort
(c) Insertion sort
(d) all are equally good

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

10) ..... element of an input array is chosen as pivot in Randomized Quicksort *1 point*

(a) The first number in array
(b) The last number in the array
(c) The median of the numbers
(d) A randomly selected number from the array

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

Unit 6 - Week 4

Assignment 4

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-26, 23:59 IST.

1) "Any comparision sort must make $\Omega(nlogn)$ comparisions in the worst case to sort n elements". *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

2) Which of the following is **False** about counting sort *1 point*

(a) Counting sort has no comparisons between input elements
(b) Counting sort is stable
(c) Counting sort is used as a subroutine to Radix sort
(d) Counting sort is unstable

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

3) The i^{th} order static of a set of n elements is the *1 point*

(a) i^{th} smallest element
(b) i^{th} largest element
(c) any of the n elements

a.
b.
c.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

4) The first order static ($i = 1$) of a set n elements is the *1 point*

(a) Maximum of the set
(b) Minimum of the set
(c) Median of the set
(d) There is no such term

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Will the algorithm SELECT work in linear time if groups of 7 are used instead of 5 *1 point*

(a) Yes
(b) No

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) Given n d-digit numbers in which each digit can take on up to k possible values, RADIX-SORT correctly sorts these numbers in *1 point*

(a) $\Theta(d(n + k))$ time.
(b) $\Theta(d(n \times k))$ time.
(c) $\Theta(d(n^k))$ time.
(d) $\Theta(d^{(n+k)})$ time.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7) Given n b-bit numbers and any positive integer $r < b$, RADIX-SORT correctly sorts these numbers in *1 point*

(a) $\Theta((b/r)(n + 2^r))$ time.
(b) $\Theta((br)(n + 2r))$ time.
(c) $\Theta((br)(n \times 2^r))$ time.
(d) $\Theta((r/b)(n \times (2/r)))$ time.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

8) If the input elements to Bucket sort is drawn from a random distribution, then the run time of Bucket sort is *1 point*

(a) Linear
(b) Quadratic
(c) Qubic
(d) Biquadratic

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) let n_i be the random variable denoting the number of elements placed in bucket $B[i]$, then the running time of the Bucket sort is *1 point*

(a) $T(n) = \Theta(n) + \sum_{i=0}^{n-1} \mathcal{O}(n)$
(b) $T(n) = \Theta(n) + \sum_{i=0}^{n-1} \mathcal{O}(logn)$
(c) $T(n) = \Theta(n) + \sum_{i=0}^{n-1} \mathcal{O}(n^2)$
(d) $T(n) = \Theta(n) + \sum_{i=0}^{n-1} \mathcal{O}(n^3)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) Consider that the input to Bucket sort is not drawn from a random distribution, but the input has the property that the sum of the squares of the bucket sizes is linear in the total number of elements, then the running time of Bucket sort is *1 point*

(a) Linear
(b) Quadratic
(c) Qubic
(d) Biquadratic

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

Unit 7 - Week 5

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-04, 23:59 IST.

1) Which of the following is **NOT** a dictionary operation *1 point*

(a) Insert
(b) Sort
(c) Search
(d) Delete

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) Given a hash table T with n slots that stores m elements, we define the load factor a for T *1 point*

(a) n/m
(b) m/n
(c) nm
(d) n^m

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

3) Consider we insert the keys $5, 28, 19, 15, 20, 33, 12, 17, 10$ into a hash table with collisions resolved by chaining. Let the table have $9 (0, 1, \ldots, 8)$ slots, and let the hash function be $h(k) = k \mod 9$. Then the 5^{th} slot will contain *1 point*

(a) 3 elements
(b) 2 elements
(c) 1 elements
(d) 0 elements

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

4) In the division method for creating hash functions, the hash function is (k is the key to be hashed and m is the available slots) *1 point*

(a) $h(k) = k \mod m$
(b) $h(k) = k/m$
(c) $h(k) = m/k$
(d) $h(k) = m \mod k$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

5) Double hashing uses a hash function of the form, where h_1 and h_2 are auxiliary hash functions., *1 point*

(a) $h(k,i) = (h_1(k) \times ih_2(k)) mod m$
(b) $h(k,i) = (h_1(k) + ih_2(k)) mod m$
(c) $h(k,i) = (h_1(k)/ih_2(k)) mod m$
(d) None of the above

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

6) Inserting an element into an open-address hash table with load factor α requires at most ..... probes on average, assuming uniform hashing. *1 point*

(a) $\frac{1}{1+\alpha}$
(b) $\frac{1}{1-\alpha}$
(c) $\frac{1}{\alpha}$
(d) α

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

7) Given an open-address hash table with load factor $\alpha < 1$, the expected number of probes in a successful search is at most *1 point*

(a) $\frac{1}{\alpha} \ln \frac{1}{1+\alpha}$
(b) $\frac{1}{\alpha} \ln \frac{1}{2}$
(c) $\frac{1}{\alpha} \ln \frac{1}{1-\alpha}$
(d) $\frac{1}{1+\alpha} \ln \frac{1}{1+\alpha}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

8) Consider an open-address hash table with uniform hashing. The upper bound on the expected number of probes in an unsuccessful search when the load factor is $3/4$ is *1 point*

(a) 1
(b) 2
(c) 3
(d) 4

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

9) Consider an open-address hash table with uniform hashing. The upper bound on the expected number of probes in a successful search when the load factor is $7/8$ is: *1 point*

(a) 2.377
(b) 1.998
(c) 1.567
(d) 1.4

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

10) If we store n keys in a hash table of size $m = n^2$ using a hash function h randomly chosen from a universal class of hash functions, then the probability of there being any collisions is less than *1 point*

(a) 1/2
(b) -0.5
(c) 1/4
(d) 0

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

Unit 8 - Week 6

Assignment 6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-11, 23:59 IST.

1) Let x be a node in a binary search tree. If y is a node in the right subtree of x, 1 point

(a) $key[y] \leq key[x]$
(b) $key[y] \geq key[x]$

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) The algorithm in which the key of the root of a subtree is printed after the values in its subtrees is called 1 point

(a) inorder tree walk
(b) preorder tree walk
(c) postorder tree walk
(d) none of the above

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

3) The expected height of a randomly built binary search tree on n keys is 1 point

(a) $\mathcal{O}(n \log n)$
(b) $\mathcal{O}(\log n)$
(c) $\mathcal{O}(n)$
(d) $\mathcal{O}(n^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

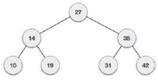
4) Which of the following is NOT a property of a red black tree 1 point

(a) Every node is either red or black.
(b) The root is red.
(c) Every leaf (NIL) is black.
(d) If a node is red, then both its children are black.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Consider the Red Black Tree given below, given that the node containing key value 35 is red, how many black nodes are there in the red black tree?(Do not count the nils) 1 point



(a) 3
(b) 2
(c) 5
(d) 6

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

6) The largest possible number of internal nodes in a red-black tree with black-height k is 1 point

(a) $2^{2k} + 1$ internal nodes.
(b) $2^k - 1$ internal nodes.
(c) $2^{2k} - 1$ internal nodes.
(d) $2^k + 1$ internal nodes.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

7) If f is a convex function and X is a random variable, then according to Jensen's Inequality 1 point

(a) $f((E[X])) \geq E[f(X)]$
(b) $f((E[X])) \leq E[f(X)]$
(c) $f((E[X])) < E[f(X)]$
(d) $f((E[X])) > E[f(X)]$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) Every n-node binary search tree, there are exactly 1 point

(a) $n - 1$ possible rotations
(b) n possible rotations
(c) $n + 1$ possible rotations
(d) $2n$ possible rotations

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) In the Order Statistic Tree, along with the key, what other information is stored in the nodes? (Here size(left[x]) is size of left subtree of node x and similarly size(right[x]) is size of right subtree of node x.) 1 point

(a) size(left[x])
(b) size(right[x])+1
(c) size(left[x])+size(right[x])+1
(d) None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) Given the following numbers, arrange them into a Binary Search Tree. Let the root be at position 1. If a node is at position is i, the right child will be at position $2i + 1$ and left child at $2i$ (i.e. the right child of root will be at position 3). While forming a binary search tree by inserting 9, 5,1,12,6,7,8 in order, which positions will be filled? 1 point

(a) 1,2,3,4,5,11,23
(b) 1,2,3,6,5,10,20
(c) 1,2,4,8,3,6,12
(d) 1,2,3,4,5,6,12

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

Unit 9 - Week 7

Assignment 7

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-18, 23:59 IST.

1) "In an amortized analysis, the time required to perform a sequence of data-structure operations is summed over all the operations performed". This statement is *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) If red black tree is used to store the dynamic set S in sweep-line algorithm, then the total running time of the algorithm is *1 point*

(a) $\mathcal{O}(\log n)$
(b) $\mathcal{O}(n \log n)$
(c) $\mathcal{O}(n)$
(d) $\mathcal{O}(\log \log n)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

3) Suppose we perform a sequence of n operations on a data structure in which the i^{th} operation costs i if i is an exact power of 2, and 1 otherwise. Using aggregate analysis the amortized cost per operation is *1 point*

(a) $\mathcal{O}(n)$
(b) $\mathcal{O}(n \log n)$
(c) $\mathcal{O}(1)$
(d) $\mathcal{O}(\log n)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

4) The space complexity of a $2-D$ range tree is *1 point*

(a) $\mathcal{O}(n)$
(b) $\mathcal{O}(\log n)$
(c) $\mathcal{O}(\log \log n)$
(d) $\mathcal{O}(n \log n)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

5) $\mathcal{O}(\log \log u)$ is the worst case time complexity of *1 point*

(a) Finding Successor in Van Emde Boas Data Structure
(b) Finding Predecessor in Van Emde Boas Data Structure
(c) Inserting into Van Emde Boas Data Structure
(d) All of the above

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

6) In Van Emde Boas Data Structure ,if size of the universe is 16 ,how many widgets (blocks) will the universe be split into ? *1 point*

(a) 3
(b) 4
(c) 5
(d) 2

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

7) Given the dynamic set $S = \{1, 7, 11, 13\}$ and the size of the universe is 16, What will the call Predecessor(9) return? *1 point*

(a) 7
(b) 1
(c) 11
(d) 0

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

8) A sequence of n insertions into a dynamic table will have a worst case runtime of *1 point*

(a) $\theta(n \log n)$
(b) $\theta(n)$
(c) $\theta(1)$
(d) None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

9) In amortized analysis, what will be the cost of insertion of the $6^{th}, 5^{th}, 12^{th}, 17^{th}$, and 9^{th} insertion, respectively? *1 point*

(a) $1, 5, 1, 17, 1$
(b) $6, 1, 12, 1, 9$
(c) $1, 5, 1, 17, 9$
(d) $1, 5, 12, 17, 9$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) In Table Doubling, to store 56 elements, how many tables will need to be dynamically allocated? *1 point*

(a) 7
(b) 8
(c) 4
(d) 9

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

Unit 10 - Week 8

Assignment 8

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-25, 23:59 IST.

1) Which of the following is/are property/properties of a dynamic programming problem? — 1 point

(a) Optimal substructure
(b) Overlapping subproblems
(c) Greedy approach
(d) Both optimal substructure and overlapping subproblems

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) In dynamic programming, the technique of storing the previously calculated values is called — 1 point

(a) Saving value property
(b) Storing value property
(c) Memoization
(d) Mapping

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

3) Prim's algorithm is a — 1 point

(a) Divide and conquer algorithm
(b) Greedy algorithm
(c) Dynamic Programming
(d) Approximation algorithm

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) What is the number of edges present in a complete graph having n vertices? — 1 point

(a) $\frac{n(n+1)}{2}$
(b) $\frac{n(n-1)}{2}$
(c) n
(d) Information given is insufficient

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) What would be the number of zeros in the adjacency matrix of the given graph? — 1 point

(a) 10
(b) 6
(c) 16
(d) 0

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) Consider the undirected graph below: — 1 point

Using Prim's algorithm to construct a minimum spanning tree starting with node A, which one of the following sequences of edges represents a possible order in which the edges would be added to construct the minimum spanning tree?

(a) (E, G), (C, F), (F, G), (A, D), (A, B), (A, C)
(b) (A, D), (A, B), (A, C), (C, F), (G, E), (F, G)
(c) (A, B), (A, D), (D, F), (F, G), (G, E), (F, C)
(d) (A, D), (A, B), (D, F), (F, C), (F, G), (G, E)

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

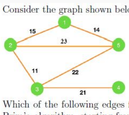
7) How do we know when to stop Prim's algorithm for finding the minimum spanning tree of a given graph? — 1 point

(a) There is no stopping point, so the algorithm is continued indefinitely.
(b) When all of the vertices of the original graph are included in the tree
(c) When all of the edges of the original graph are included in the tree
(d) When half of the vertices of the original graph are included in the tree

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) Consider the graph shown below. — 1 point



Which of the following edges form the MST of the given graph using Prim's algorithm, starting from vertex 4.

(a) (4-3)(5-3)(2-3)(1-2)
(b) (4-3)(3-5)(5-1)(1-2)
(c) (4-3)(3-5)(5-2)(1-5)
(d) (4-3)(3-2)(2-1)(1-5)

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

9) Consider two strings A = *qpqrr* and B = *pqprqrp*. Let x be the length of the longest common subsequence (not necessarily contiguous) between A and B and let y be the number of such longest common subsequences between A and B. Then x + 10y = — 1 point

(a) 33
(b) 23
(c) 43
(d) 34

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

10) Consider the following statement *"A locally optimal choice is globally optimal"*. This statement is — 0 points

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

Unit 11 - Week 9

Assignment 9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-01, 23:59 IST.

1) Which of the following is the most commonly used data structure for implementing Dijkstras Algorithm? *1 point*

(a) Max priority queue
(b) Stack
(c) Circular queue
(d) Min priority queue

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) Is the following statement true? *1 point*
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.

(a) Yes
(b) No

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

3) Which of the following are the properties of Shortest path? *1 point*

(a) Triangle inequality For all $(u, v) \in E$, we have $\delta(s, v) \leq \delta(s, u) + w(u, v)$.
(b) Upper-bound property: If d[v] $\geq \delta(s, v)$ $\forall$ v. than d[v] $= \delta(s, v)$,
(c) No-path property: If $\delta(s, v) = \infty$, then d[v] $= \infty$ always.
(d) All of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

4) What is running time of Dijkstras algorithm using Binary min- heap method? *1 point*

(a) $\mathcal{O}(|V|)$
(b) $\mathcal{O}(|V|log|V|)$
(c) $\mathcal{O}(|E|)$
(d) $\mathcal{O}(|E|log|V|)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

5) How many times the for loop in the Bellmann Ford Algorithm gets executed? *1 point*

(a) V times
(b) $V - 1$ times
(c) E times
(d) $E - 1$ times

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

6) Which of the following can be solved using BFS *1 point*

(a) Testing wheather the graph is connected.
(b) Computing a spanning forest of the graph.
(c) Computing a cycle in a graph or reporting that no such such cycle exist.
(d) All of these above.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

7) In a weighted graph, assume that the shortest path from a source s to a destination t is correctly calculated using a shortest path algorithm. Is the following statement true? *1 point*
"If we increase weight of every edge by 1, the shortest path always remains same."

(a) Yes
(b) No

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) Which of the following statements are true *1 point*
Statement1: A subpath of a shortest path is a shortest path.
Statement2: If a graph G contains a negetive weight cycle, then some shortest path may not be exist.

(a) Statement 1 is true but 2 is false
(b) Statement 1 is false but 2 is true
(c) Both are true

a.
b.
c.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

9) The Breadth First Search algorithm has been implemented using the queue data structure. One possible order of visiting the nodes of the following graph is *1 point*

(a) MNOPQR
(b) NQMPOR
(c) QMNPRO
(d) QMNPOR

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) In DFS, if(u, v) is an edge which connects two node such that they do not have any ancestor and a descendant relationship between them, than the edge is called *1 point*

(a) Tree edge
(b) Back edge
(c) Forword edge
(d) Cross edge

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

Unit 12 - Week 10

Assignment 10

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-08, 23:59 IST.

1) Which of the following statement are true ? *1 point*

Statement 1: If the constraint graph contains negetive weight cycle, then the system of differences in not unsatisfiable.
Statement 2: If no negetive weight cycle exists in the constraint graph, then the constraints are satisfiable.

(a) only Statement 1
(b) only Statement 2
(c) Both Statement 1 and Statement 2

a.
b.
c.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) In Dense graph G=(V,E,) what is the run of Bellmen Ford Algorithm for solving All pair Shortest Path algorithm? *1 point*

(a) $\mathcal{O}(|V|^2)$
(b) $\mathcal{O}(|V|^3)$
(c) $\mathcal{O}(|V|^4)$
(d) $\mathcal{O}(|V|)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

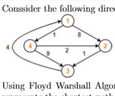
3) What is the formula to compute the transitive closure of a graph? *1 point*

(a) $t_{ij}^{(k)} = t_{ij}^{(k-1)}$ AND $(t_{ik}^{(k-1)} \text{OR } t_{kj}^{(k-1)})$
(b) $t_{ij}^{(k)} = t_{ij}^{(k-1)}$ OR $(t_{ik}^{(k-1)} \text{AND } t_{kj}^{(k-1)})$
(c) $t_{ij}^{(k)} = t_{ij}^{(k-1)}$ AND $(t_{ik}^{(k-1)}$ AND $t_{kj}^{(k-1)})$
(d) $t_{ij}^{(k)} = t_{ij}^{(k-1)}$ OR $(t_{ik}^{(k-1)} \text{OR } t_{kj}^{(k-1)})$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) Consider the following directed graph *1 point*



Using Floyd Warshall Algorithm and find which of following matrix represents the shortest path distance between every pair of vertices.

(a) $\begin{bmatrix} 0 & 3 & 4 & 1 \\ 5 & 0 & 1 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 0 & 3 & -9 & 1 \\ 5 & 0 & 4 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 3 & 9 & 1 \\ 5 & 0 & 4 & 6 \\ 2 & 3 & 1 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 3 & -4 & 1 \\ 5 & 0 & 4 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{bmatrix}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

5) Consider the following statement "Johnson Algorithm works by using the BellmanFord algorithm to compute a transformation of the input graph that removes all negative weights, allowing Dijkstra's algorithm to be used on the transformed graph". The statement is *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) What is the run time of Johnson algorithm in worst case *1 point*

(a) $\mathcal{O}(|V||E| + |V|^2 log|V|)$
(b) $\mathcal{O}(|E| + |V| log|V|)$
(c) $\mathcal{O}(|V||E|)$
(d) $\mathcal{O}(|V|^2)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7) What happens in $d_{ij}^{(k)}$,when the value of k is 0 in the Floyd Warshall Algorithm? *1 point*

(a) 1 intermediate vertex
(b) 0 intermediate vertex
(c) N intermediate vertices
(d) N-1 intermediate vertices

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) Bellmann Ford Algorithm is an example for *1 point*

(a) Dynamic Programming
(b) Greedy Algorithms
(c) Linear Programming
(d) Branch and Bound

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) The running time of Bellman ford algorithm is lower than that of Dijkstra's Algorithm *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

10) Given a system of difference constrints, let G=(V,E) be the corrosponding constraint graph. If G has a negetive weight cycle, than the system of contraints has *1 point*

(a) Unique solution.
(b) infinite nunmer of solution
(c) No feasible solution.
(d) Exactly two solution exist

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

Unit 13 - Week 11

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-15, 23:59 IST.

1) In disjoint set data structure, *representative element* supports which of the following operation? *1 point*

(a) Find-Set
(b) Union
(c) Make-Set
(d) All of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

2) let $\mathcal{S}=\{S_1, S_2, ..., S_n\}$ be the collection of disjoint sets, then after how many maximum UNION operation will the set $\mathcal{S}$ contain exactly one set? *1 point*

(a) $n-1$
(b) $n-3$
(c) $n-2$
(d) None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

3) If for each set $S_i=\{x_1, x_2, ...x_m\}$ as balanced tree, then what is time complexcity in worst case for FIND-SET(x) operation, for some x? *1 point*

(a) Θ(n)
(b) Θ(logn)
(c) $\Theta(n^2)$
(d) $\Theta(1)$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) "The *MakeSet* operation makes a new set by creating a new element with a unique id, a rank of 0, and a parent pointer to itself. The parent pointer to itself indicates that the element is the representative member of its own set."
The above statement is *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

5) If we concatinate samller lists into the end of larger list and n is the overall numbers of elements, then cost of all UNIONs is *1 point*

(a) $\mathcal{O}(n \log n)$
(b) $\mathcal{O}(\log \log n)$
(c) $\mathcal{O}(1)$
(d) None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

6) Given a flow network $G = (V, E)$, let f_1 and f_2 be functions from $V \times V$ to $\mathbb{R}$. The flow sum $f_1 + f_2$ is the function from $V \times V$ to $\mathbb{R}$ by *1 point*

$$(f_1 + f_2)(u, v) = f_1(u, v) + f_2(u, v) \ \forall u, v \in V$$

If f_1 and f_2 are flows in G, then which of the flow properties must the flow sum $f_1 + f_2$ satisfy?

(a) Skew symmertry, flow conservation
(b) Flow cinservation, capacity constraints
(c) Capacity constraints, skew symmetry
(d) Flow cinservation, capacity constraints, skew symmetry

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

7) For any integer $j \geq 1$ the value of $A_1(j)$ is ----------, where A is Ackermann's function *1 point*

(a) $2j-1$
(b) $2j+1$
(c) $2j$
(d) $j+1$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

8) What does Maximum flow problem involve? *1 point*

(a) finding a flow between source and sink that is maximum
(b) finding a flow between source and sink that is minimum
(c) finding the shortest path between source and sink
(d) computing a minimum spanning tree

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

9) A vertex is called *source* if the vertex --------- *1 point*

(a) has no incoming edges
(b) has no leaving edges
(c) is a central vertex
(d) has the least weight

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

10) What is the maximum number of minimum cuts that a graph with n vertices can have? *1 point*

(a) $n+1$
(b) $n(n-1)$
(c) $\frac{n(n-1)}{2}$
(d) $\frac{n(n+1)}{2}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

Unit 14 - Week 12

Assignment 12

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-04-22, 23:59 IST.

1) If f be any flow, (S,T) be any cut, C be capacity of a flow network $G=(V,E)$ tean which of the following relation does not hold? *1 point*

(a) $|f| = f(S,T)$
(b) $|f| > C(S,T)$
(c) $|f| = f(V,t)$ where t is the *sink* of network flow
(d) $f(X \cup Y, Z) = f(X,Z) + f(Y,Z)$ if $X \cap Y = \phi$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

2) Which of the following statement is true? *1 point*
Statement 1: The value of any flow is bounded below by the capacity of any cut.
Statement 2: In a flow network, the maximum amount of flow passing from the source to the sink is equal to the total weight of the edges in the minimum cut.

(a) Only statement 1
(b) Only Statement 2
(c) Neither Statement 1 nor Statement 2
(d) Both of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

3) If f be a flow on $G=(V,E)$, the residual network $G_f(V,E_f)$ is the graph with strictly possitive residual capacities if *1 point*

(a) $C_f(u,v) = C(u,v) - f(u,v) > 0$
(b) $C_f(u,v) = f(u,v) - C(u,v) > 0$
(c) $C_f(u,v) = C(u,v) - f(u,v) < 0$
(d) $C_f(u,v) = f(u,v) - C(u,v) < 0$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

4) Halting problem is an example for? *1 point*

(a) decidable problem
(b) undecidable problem
(c) complete problem
(d) trackable problem

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Consider the following statements: *1 point*
Statement 1: The basic idea of dynamic programming is drawn from the intuition behind divide-and-conquer and is essentially the opposite of greedy strategy.
Statement 2: When dynamic programming is applied to a problem, it takes far less time as compared to other methods that don't take advantage of overlapping subproblems.
Then

(a) Only statement 1 is true.
(b) Only statement 2 is true.
(c) Both statements are true.
(d) Both statements are false.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

6) Assuming P $\neq$ NP, which of the following is true ? *1 point*

(a) NP-complete = NP
(b) NP-complete $\cap$ P = Φ
(c) NP-hard = NP
(d) P = NP-complete

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

7) In computational complexity, which ofthe following subsets inclusion is true, where $\mathcal{P}, \mathcal{E}, \mathcal{R}$ is the set of problems solvable in polynomial, exponential and finite time respectively. ? *1 point*

(a) $\mathcal{P} \subsetneq \mathcal{E} \subsetneq \mathcal{R}$
(b) $\mathcal{P} \subseteq \mathcal{R} \subseteq \mathcal{E}$
(c) $\mathcal{P} \supsetneq \mathcal{E} \supsetneq \mathcal{R}$
(d) None of these.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

8) Which of the following is **NOT** a example of NP complete problem? *1 point*

(a) 3 colouring of a given graph
(b) Travelling salesman problem
(c) Knapsack
(d) Halting Problem

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

9) Let X be a problem that belongs to the class NP. Then which one of the following is TRUE? *1 point*

(a) There is no polynomial time algorithm for X.
(b) If X can be solved deterministically in polynomial time, then P = NP.
(c) If X is NP-hard, then it is NP-complete.
(d) X may be undecidable.

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) "If X is NP complete, then X is solvable in polynimial time *iff* P=NP" The above statement is *1 point*

(a) True
(b) False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.