

CS502 grand quiz answers

0. Al-khwarizmi was a/an _____

B , **Mathematician**

) In heap sort algorithm, we build _____ for ascending sort.

- **Max Heap**
- Min Heap

2) Quicksort is _____ based on the divide and conquer strategy.

- Not
- **Always (Pg#46)**
- Sometime
- Occasionally

3) _____ overcomes the limitations of _____ by working as per positional notation of numbers.

- Counting Sort, Radix Sort
- **Radix Sort, Counting Sort**

4) In heap sort algorithm, every time the maximum element is removed _____.

- **We called build heap procedure.**
- Heap sort algorithm terminate., • We call heapify procedure,
- Nothing happens.

5) Rank of an element can be defined as _____.

- One minus the number of element that can be smaller.
- Two plus the number of element that can be greater. • **One plus the number of element that can be smaller.**
(Pg#34) • Two plus the number of element that can be smaller.

6) Radix sort is not a non-comparative integer sorting algorithm.

- **True**

- False

7) In Dynamic Programming, our approach is to _____

- Develop the solution in a top down fashion
- Express the Problems Non-Recursively
- Build the solution in a bottom-up fashion.(pg#79) • Input several sub problems.

8) Efficient algorithm requires less computational...

- Memory
- Running Time
- Memory and Running Time (Pg#9)
- Energy

9) If p_j dominates p_i and p_i dominates p_h then p_j also dominate p_h it means dominant relation is.

- Transitive
- Non Transitive
- Equation
- Symbolic

10) Sorting algorithm having O (orderly) _____ running time is considered to be slow ones.

- N
- N^2 (pg#39)
- N^3
- $\log(n)$

11) In plane sweep approach, a vertical line is swept across the 2d-plane from.....

- Right to Left
- Left to Right
- Top to Bottom
- Bottom to Top

12) If we associate (x, y) integers pair to cars where x is the speed of car and y is the negation of the price. High y value for a car means acar.

- Fast
- Slow
- Expensive
- Cheap

13) If the indices passed to merge sort algorithm are ... Then this means that there is only one element to sort.

- Small
- Large
- Equal
- Not Equal

14) Merge sort is based on.....

- Brute-Force
- Plane-sweep
- Axis-sweep
- Divide and Conquer

15) In asymptotical analysis of $n^*(5+2)^{-3}$, as n becomes large, the dominant (fastest growing) term is some constant times...

- $n-1$
- n
- $n+1$
- $n*n$

16) The process ofends when you are left with such tiny pieces remaining that it is trivial to solve them.

- Brute-force
- Plane-sweep
- Divide and conquer
- Axis-sweep

17) The sequence of merge sort algorithm is:

- Divide-Combine-Conquer • Conquer-Divide-Combine
- Divide-Conquer-Combine

- Combine- Conquer-Combine

18) While solving Selection problem, in Sieve technique we partition input data...

- In increasing order
- In decreasing order
- According to pivot
- Randomly

19) Result of asymptotical analysis of $n(n-3)$ and $4n^2$ is that

- $n(n-1)$ is asymptotically Less
- $n(n-1)$ is asymptotically Greater
- Both are asymptotically Not equivalent
- Both are asymptotically Equivalent

20) In Heap Sort algorithm, we build....for ascending sort.

- Max heap
- Min heap

21) Quick sort is a not a partitioning based algorithm

- True
- False

22) In 2d-maxima problem, a point is said to be _____ if it is not dominated by any other point in that space.

- Moniter
- Minimal
- Maximal
- Joine

23) The definition of theta notation is refer to proving _____satisfied asymptotic bound.

- Over
- Lower

- Upper
- Both lower& upper

24) Sieve technique is very important special case of divide-and-conquer strategy.

- True
- False

25) Boolean operation in a _____ operation on an ideal led RAM model of computation.

- Starting
- Basic
- Advance
- Normal

26) While solving selection problem in sieve technique choose pivot.

- Minimum element
- Maximum element
- Randomly

27) If the indicate passed the merge sort algorithm are _____ then this merges that there is only one elemental sort.

- Small
- Large
- Equal
- Non equal

28) The running time of quick sort algorithm.

- Is importable to compute
- Has nothing to do with pivot selection
- Is randomly upon each execution
- Greatly influenced by the selection of pivot

29) In heap sort algorithm, we build for according sort.

- Max heap
- Min heap

30) In merge sort algorithm, we split the array around five _____ index q

- Entering
- **Mid**
- existing
- starting

31) Dynamic Programming strategy is useful when sub-problems are independent

- **True (PAGE 75)**
- False

32) In Plane sweep approach, a vertical line is swept across the 2d plane from

- Right to left
- **Left to right (PAGE 18)**
- Top to bottom
- Bottom to top

33) Bubble sort is not an in-place sorting algorithm.

- True
- **False (page 39)**

34) Boolean operation is a _____ operation on an idealized RAM model of computation.

- Starting
- Basic
- **Advance (page 11)**
- Normal

35) Algorithm is a sequence of computational steps that _____ the input into output

- Merge
- Assign
- **Transform (page 7)**
- Integrate

36) In quick sort algorithms, pivots form _____

- Stack
- Queue
- Binary search tree (page 49)
- Graph

37) In selection algorithm, we assume pivot selection take theta _____ running time.

- n (page 37)
- n^2
- n^3
- $\log(n)$

38) Brute force algorithm for 2d maxima is operated by comparing _____ pairs of points.

- a) two
- b) some
- a) most
- d) all (page 18)**
- b)

39) in generating Fibonacci sequence, we can avoid un necessary repetitions by _____ process

- a) tokenization
- b) memorization (page 74)**
- b) randomization
- d) memorization

40) the sieve technique is a special case, where the number of sub problems is just _____

- a) **1 (page 34)**
- b) 2
- b) 3
- d) 4

25) Time complexity of dynamic programming based algorithm for computing the minimum cost of chain matrix multiplication is _____

- $\log n$
- N
- n^2 (n square)
- **n^3 (n cube) (page 90)**

26) Dynamic programming strategy is useful when sub problems are independent

- true
- **false**

27) We can make _____ recursive calls in Fibonacci sequence

- **Infinite (page 74)**
- Finite

28) Counting sort is suitable to sort the elements in range 1 to k

- k is large
- k is small (page 57)
- k may be large or small
- none

29) Dynamic programming comprises of _____

- Recursion only
- Repetition only
- Recursion and repetition
- no repetition but recursion only (page 75)

30) As per algorithm of dynamic programming we need to store the results of _____

- First sub problem only
- Best situation only
- Intermediate sub problems (page 75)
- final situation only

31) Bubble sort is not an in-place sorting problem.

- True
- False (page 54)

32) Dynamic programming is a problem solving approach in which _____

- Problem is solved in zero time
- Solution is developed only at final stage
- Both are incorrect (page 73)
- Both are correct

33) Counting sort is suitable for sorting the elements within range 1 to P where, _____

- p is large
- p is small (page 57)
- p is very large
- p is undetermined

34) Memorization is a part of Dynamic Programming strategy.

- True
- **False**

35) Dynamic Programming is a problem-solving approach in which...

- Problem is solved in zero time
- Solution is developed only at final stage
- Both are correct
- **Both are incorrect (pg#75)**

36) Quicksort is a/anandsorting algorithm.

- Not in place, not stable one
- In place, not stable one
- **In place, stable one (pg#54)**
- Not in place, stable one

37) Insertion sort is an in-place sorting algorithm.

- **True (pg#54)**
- False

38) An in-place sorting algorithm is one that.....uses additional array for storage.

- Always
- Permanently
- **Does not (pg#54)**
- Sometime

39) In Brute Force solution of Knapsack Problem, there arepossible combinations for n times.

- 2
- n
- **2^n (2 raise to the power n) (pg#92)**
- 3^n (3 raise to the power n)

40) Overcomes the limitations ofby working as per positional notations of numbers.

- Counting sort, Radix sort
- Radix sort, Counting sort (pg#71)

41) Identify the TRUE statement.

- The Knapsack problem does not belong to the domain of optimization problems.
- The Knapsack problem belongs to the domain of optimization problems.
- The knapsack problem cannot be solved by using dynamic programming • The knapsack problem is optimally solved by using brute force algorithm.

42) Selection sort is not an in-place sorting algorithm

- True
- False (pg#54)

43) Bubble sort is not an in-place sorting algorithm.

- True
- False (pg#54)

44) In plane sweep approach of solving geometric problems, a is swept across the plan.

- Line
- Plan
- Cube
- Box

45) Quick sort algorithm was developed by

- Alfred Aho
- Sedgewich
- John Vincent Atanasoff
- Tony Hoare

46) In max heap (for Heap Sort algorithm), when every time maximum element is removed from top we replace it with leaf in the tree.

- Second last
- Last
- First
- Any

47) In Quick Sort algorithm, _____ decides nature of Binary Search Tree formed by Pivots.

- No one
- Smallest element from input
- Rank of the Pivot
- Largest element from Pivot

48) While analyzing Selection algorithm, we make a number of passes, in fact it could be as_ many as.

- $n(n+1)$
- $\log(n)$
- $n/3$
- $n/4$

49) While solving Selection problem, in Sieve technique we choose pivot

- Minimum element
- Maximum element
- Randomly
- Average element

50) Boolean operation is an _____ operation on an idealized RAM model of computation.

- Starting
- Basic
- Advance
- Normal

51) If the indices passed to merge sort algorithm are _____ then this means that there is only one element to sort.

- Small

- Large
- Equal
- Not Equal

52) To find maximal points in brute-force algorithm, each point of the space is composed against _____ of that space.

- One other point
- All other points
- Few other points
- Most of the other points

53) In Heap Sort algorithm (using max heap), when every time maximum element is removed from top _____.

- We call merge Sort algorithm
- It became Order n^2 Algorithm
- Divide and Conquer strategy helps us
- We are left with a hole

54) While analyzing selection algorithm, we make a number of passes infact it could be as many as;

- $N^{(n+1)}$
- $\text{Log}(n)$
- $n/3$
- $n/4$

55) Sorting can be in _____

- Increasing order only
- Decreasing order only
- Both increasing and decreasing order
- random

56) In the statement

*if $p(i)x < p[j]x) \& (p[i]y < p[j]y)^m$

The number of times elements of P are accessed is _____

- 1

- 2
- 3
- 4

57) In selection problem the rank of an element will be a _____ position if we sort the input data.

- First
- Final (p34)
- Second last
- Last

58) Merge sort is based on _____

- Basic force
- Plan sweep
- axis sweep
- divide and conquer (p 28)

59) There are so hard formal rules to the syntax of the _____ code.

- Basic
- Programming
- Pseudo(not sure)
- assembly

76) The heap sort algorithm the total running time for heavily procedure is _____

- Theta($\log n$) p(40)
- Order($\log n$)
- Omega($\log n$)
- O1iii constraint time

77) The brute-force algorithm for 2-D maxima runs in order $O(___)$ time

- (n) (p 13)
- $N(\log n)$
- $N*n$
- $N(o)$

78) In sorting the key value of attribute ____an order domain

- Must be
- Not always

79) Rank of an element can be defined as _____

- The number of element that are smaller
- Two plus the number of elements that are greater(not sure)
- One plus the number of element that are smaller
- Two minus the number of elements that are smaller

80) Unlike programs, algorithm to be understood primarily by _____ and _____.

- Machines not people
- Mathematical expression, not algebraic expression
- Programmers ,not machines
- RAM, not programmer

81) Recurrences are useful for analyzing

- Recursive Algorithms
- Simple Algorithms
- Parallel Algorithms
- Parallel Algorithms & Recursive Algorithms

82) Divide and conquer involve breaking the problem into small number of

- Pivot
- Sub problems
- Selection
- Sieve

83) In which order we can sort?

- Increasing or decreasing order
- Both at the same time
- Increasing order only
- Decreasing order only

84) comparison based sorting algorithms cannot run faster than

- $\Omega(n \log n)$
- $O(n \log n)$
- $\Omega(n^2)$
- $O(n^2)$

85) In Quick sort, we don't have the control over the sizes of recursive calls

- True
- False
- Less information to decide
- Either true or false

86) Who invented Quick sort procedure?

- Hoare
- Segewick • Mellroy
- Coreman

87) Counting sort assumes that the numbers to be sorted are in the range 1 to where k is

- Small
- Large
- No restriction on k
- None of these

88) If there are $\Theta(n^2)$ entries in edit distance matrix then the total running time is

- $\Theta(1)$
- $\Theta(n^2)$
- $\Theta(n)$
- $\Theta(n \log n)$

89) When the recursive algorithm revisits the same problem over and over again, we say that the optimization problem has sub-problems.

- Overlapping
- Over costing
- Optimized
- None of these

90) A $p \times q$ matrix A can be multiplied with a $q \times r$ matrix B. The result will be a $p \times r$ matrix C. In particular, for $1 \leq i \leq p$ and $1 \leq j \leq r$

$$C[i][j] = \sum_{k=1}^q A[i][k] B[k][j]$$

$$C[i][j] = \sum_{k=1}^q A[k][i] B[j][k]$$

- None of these

91) We can find the product $A \times B$ of matrices A and B, only if they are compatible which means,

- No of Columns of A must be equal to No of Rows of B
- No of Columns of A must be equal to No of Columns of B
- No of Rows of A must be equal to No of Rows of B
- Order of A must be equal to order of B

92) Time complexity of chain matrix multiplication is $\Theta(n^3)$ and space complexity is

- $\Theta(n^2)$
- $\Theta(n^3)$
- $\Theta(n \log n)$
- $\Theta(\log n)$

93) Computational model of sequential RAM is:

- Parallel machine may be expensive to model and have more computational power than sequential RAM.
- Computational power of sequential RAM is same as that of parallel machines.
- Both first and second option are true
- Less powerful Computational wise than parallel machines

94) In Sieve Technique ,we know

- Item of internet
- Order of items
- complexity of items
- all items are interest

95) In Random access machine, instructions are executed

- five at a time
- infinite instruction at a time
- one-by-one
- parallel

96) Which type of instruction RAM can execute?

- Algebraic and logic
- Geometric and arithmetic
- Arithmetic and logic
- Parallel and recursive

97) Which of the following is calculated with Big O notation?

- Medium bounds
- Lower bounds
- Upper bounds
- Both lower and upper

98) Which of the following functions grows faster as n gets larger?

- $n_{10} 2_n$
- $n_8 3_n$
- $n_5 5_n$
- $n_3 2_n$

99) The worst case running time algorithm is given below is:

MAXIMA(int n, Point P[1...n])

```

1      for i ← 1 to n  n times
2      do maximal ← true
3      for j ← 1 to n  n times
4      do
5      if (i ≠ j) & ( P[i].x < P[j].x ) & ( P[i].y < P[j].y )  4 accesses
6      then maximal ← false  break
7      if maximal,
8      then  output P[i].x, P[i].y  2 accesses

```

- $\Theta(n^6)$
- $\Theta(n^6)$
- $\Theta(n^2)$
- $\Theta(2n \log 6)$

100) Al-Khwarizmi's work was written in a book titled.....

- Al Kitab al-mukhtasar fi hisab al-jabr wa'l-muqabalah (pg#7)
- Calculation by Completion
- Al Kitab
- Al-jabr wa'l-muqabalah

101) What is the asymptotic growth of $\frac{4n^3 + 15n^2 + 11n}{6}$?

- $\theta \left(\frac{4n^3 + 15n^2 + 11n}{6} \right)$
- $\theta (4n^3 + 15n^2 + 11n)$
- $(15n^2)$

$\theta(n^3)$

- (Note: Read Asymptotic Notation on pg#23 to understand this.)

102) The reason for introducing Sieve Technique algorithm is that it illustrates a very important special case of:

- Divide-and-conquer (pg#34)
- Decrease and conquer
- Greedy nature
- 2-dimension maxima

103) Strictly increasing arrays are..... input for quick sort.

- The worst-case (not sure)
- The best-case
- Average case
- None of the given

104) The running time of quick sort depends heavily on the selection of

- Required Output
- Input and output
- Pivot (pg#49)
- Input data only

105) Quick sort is based on divide and conquer paradigm. In the Combine step of divide and Conquer process:

- No work is needed to combine the sub-arrays, the array is already sorted
- Work is needed to combine the sub-arrays; the array is not already sorted
- Merging the arrays
- Dividing the arrays (not sure)

106) In in-place sorting algorithm is one that uses no...Array for storage.

- Two dimensional
- Three dimensional
- N dimensional
- An Additional array (pg#54)

107) Bubble sort and insertion sort can be implemented as stable algorithms but.....

cannot be.

- Selection sort (pg#54)
- Bubble sort
- Merge sort
- Stable sort
-

108) Catalan number is given by formula:

$$C(n) = \frac{1}{n+1} \binom{2n}{n} \quad (pg#85)$$

$$C(n) = \frac{1}{n+1} \binom{2n}{n}$$

$$C(n) = \frac{1}{n+1} \binom{2n}{n}$$

$$C(n) = \frac{1}{n+1} \binom{2n}{n}$$

109) We can find the product A×B of matrices A and B, only if they are compatible which means:

- No of column of A must be equal to No of Rows of B
- No of column of A must be equal to No of Column of B
- No of Rows of A must be equal to No of Rows of B
- Order of A must be equal to order of B

110) Matrix – Chain- Order is..... than the exponential time method of enumerating all possible parent hesitations and checking each one.

- Much more efficient
- Only fractional efficient (is ka answer given file mein b mark ni hy)
- Worst
- Too slow

111) Time complexity of chain matrix multiplication is (n^3) and space complexity is:

- $\theta(n^2)$

- (n^3)
- $(n \log n)$
- $(\log n)$

112) The Knapsack problem belongs to the domain of problems.

- Optimization (pg#91)
- NP Complete
- Linear solution
- Sorting

113) The recurrence relation of Hanoi is given below:

$$1 \quad \text{if } n = 1$$

$T(n) = \{$

$$2(n - 1) + 1 \quad \text{if } n > 1$$

In order to move a tower of 4 rings from one peg to another, how many ring moves are required?

- 15
- 7 (is ka answer given file mein b mark ni hy)
- 12
- 32

114) Which type of instruction Random Access Machine (RAM) can execute? Choose best answer.

- Algebraic and logic
- Geometric and arithmetic
- Arithmetic and logic (pg#10)
- Parallel and recursive

115) Algorithm's essential elements are:

- Step wise solution
- Stepwise solution and finite time
- Step wise solution finite inputs (not sure)
- Stepwise approach in which time and memory does not matter.

116) Which one is the correct conversion of given algorithm to sigma notation?

MAXIMA(int n, Point[1...n])

1 for i ← 1 to n **n times**(ye question full ni tha meray pass)

2 do maximal ← true **(see page #14 for remaining question**

• **and answer)**

•

• n

•

117) Which of the following is calculated with Big Theta notation?

- Lower bounds
- **Upper bounds**
- Both upper and lower bounds
- Medium bounds

118) Suppose we have an algorithm that carries out N^2 operations for an input of size N . Let us say that a computer takes 1 microsecond ($1/1000000$ second) to carry out one operation. How long does the algorithm run for an input of size 3000?

- 90 seconds (for N input, an algorithm carries out N^2 operations are carried out operations are
In given question input size is 3000, so
• **9 seconds**
(3000)²=9000000. Time for 1 operation is 1 microsecond ($1/1000000$).
• 0.9 seconds
- 0.09 seconds time for input size $n = 9000000/1000000 = 9$)

119) Which one is the best algorithm from the following with respect to running time?

- $\theta(n)$
- $\theta(n^2)$
- (n^3)
- $(n \log n)$

120) The word algorithm comes from the name of the Muslim author

- Abu Ja Far Mohammad ibn Mussal- Khwarizmi or Al Khwarizmi(p7)
- Khawarizm
- Kheva
- Uz bekistan

121) AL-Khwarizmi's work was written in a book titled_____

- Al kitab al- mukhtasar fi hisab al-jabrwa'l muqabalah (p7)
- Calculation by completion
- Al kitab
- Al jabrwa al- muqabalah

122) _____ is a graphic representation of an algorithm

- Σ notation
- Θ notation
- Flowchart(not sure)
- Asymptotic notation

123) What is the asymptotic growth of $n^2 +$

16

$4 \ 15 \ 11n + n + n ?$

- $\Theta(n^2)$ (not sure)
- $\Theta(n)$

124) Recurrences are useful for analyzing

- Recursive algorithm
- Simple algorithm
- Parallel algorithm
- Parallel algorithm & recursive algorithm

125) The sieve technique is a special case, where the number of sub problem is just

- 5
- Many
- 1 (p34)
- Few

126) What is the total time of heapify

- $O(\log n)$ (p43)
- $O(n \log n)$
- $O(n^2 \log n)$
- $O(\log^2 n)$

127) comparison based sorting algorithm cannot run faster than

- $\Omega(n \log n)$
- $O(n \log n)$ (p40)
- $\Omega(n^2)$
- $O(n^2)$

128) After partitioning array in quick sort, pivot is placed in a position such that

- Value smaller than pivot are on left and larger than pivot are on right
- Value larger than pivot are on left and smaller than pivot are on right
- Pivot is the first element of array
- Pivot is the last element of array (p47)

129) The running time of quick sort depends heavily on the selection of

- Required output
- Input and output
- Pivot(p49)
- Input data only

130) Memorization is a process

- To avoid unnecessary repetition by written down the result of recursive calls and looking them again if needed later
- To avoid repeated data by writing down the result of input array and looking them again if needed later
- None of these
- All option are correct

131) A problem exhibits _____ if an optimal solution to the problem contains within it optimal solution to sub problem

- Optimal structure
- Efficient structure
- Inefficient structure
- Unknown behavior

132) A p x q matrix can be multiplied with a q x r matrix B. The result will be a p x r matrix C. There are (p.r) total entries in C and each takes _____

- $O(q)$ (p84)
- $O(1)$
- $O(n^2)$
- $O(n^3)$

133) Catalan number of given by the formula

$$1. C(n) = \frac{1}{n+1} \binom{2n}{n}$$

$$\frac{2n!}{n!n!}$$

$$2. C(n) = \frac{2n!}{n!n!}$$

3. $C(n)=$

4. $C(n)=$

134) For chain matrix multiplication we cannot use divide and conquer approach because

- We do not know the optimum k (p86)
- We use divide and conquer for sorting only
- We can easily perform it in linear time
- Size of data is not given

135) Time complexity of chain matrix multiplication is $\Theta(n^3)$ and space complexity is

- $\Theta(n^2)$ (p84)
- $\Theta(n^3)$
- $\Theta(n \log n)$
- $\Theta(\log n)$

136) Computational model of sequential RAM is:

- Parallel machines may be expensive to model and have more computational power than sequential RAM
- computational power OF sequential RAM is same is that of parallel machine only time efficiency is achieved with parallel machine

- both first and second option are true
- less powerful computational wise than parallel machine(p10) 137) what is the correct order of operation in merge sort.
- Conquer → divide → combine
- Divide → conquer → combine(p27)
- Conquer → divide → split
- Split → conquer → destroy

138) What is the average case time for merge sort to sort an array of n element

- $O(\log n)$
- $O(n)$
- $O(n \log n)$ (p31)
- $O(n^2)$

139) What is the solution to the recurrence $T(n) = T(n/2) + n, T(1)=1$?

- $O(\log n)$
- $O(n)$
- $O(n \log n)$
- $O(n^2)$

140) Al khawarizmi work was written in a book titled

- Al kitab al-mukhastar fi hisab al jabrwa'l muqabalah (page 7)
- Calculation by completion • Al kitab
- Al jabrawa'l muqabalah

141) Unlike programs, algorithms to be understood primarily by ____ and ____

- Machines, not people
- Mathematical expressions not algebraic expressions
- Programmers, not machines (page 10)
- RAM, not programmer

142) Which formula is used for calculating worst case running time?

- $T_{\text{worst}}(n) = \max -n T(1)$ (page30)
- $T_{\text{worst}}(n) = \max + n T(1)$

- $T_{\text{worst}}(n) = \max_n T(n)$
- $T_{\text{worst}}(n) = \max T(n)$

143) Analysis of selection algorithm ends up with

- $\Theta(n)$ (page 37)
- $\Theta(1 + 1/n)$
- $\Theta(n/2)$
- $\Theta(n/2 + 2)$

144) A (an) is a left complete binary tree that confirms to the *heap order*

- Heap (page 40)
- Binary tree
- Binary search tree
- Array

145) Principal of operation for maintaining the heap property is called *heapify*, it is also called

- Shifting down (page 43)
- Shifting up
- Shifting left
- Shifting right

146) What is common between bubble sort, insertion sort, quick sort and heap sort?

- All are in place algorithms **note:-** (see articles of algorithms)
- All are stable algorithms
- None of these
- All are unstable algorithms

147) When primary memory storage is at a premium, a (an) ____ algorithm will be preferred?

- In place
- External **(not sure)**

- Stable
- None of these

148) If there are $\Theta(n^2)$ entries in edit distance matrix then the total running time is

- $\Theta(1)$
- $\Theta(n^2)$ page 26
- $\Theta(n)$
- $\Theta(n \log n)$

149) Catalan number is given by the formula

- $C(n) = \frac{1}{n+1} \binom{2n}{n}$ page 85
- $C(n) = \frac{1}{n-1} \binom{2n}{n}$
- $C(n) = \frac{1}{n+1} \binom{2n}{n}$
- $C_n = \frac{1}{n-1} \binom{2n}{n}$

150) For chain matrix multiplication, we cannot use divide and conquer approach because

- We do not have the optimum k (page 86)
- We use divide and conquer for sorting only
- We can easily perform it in linear time'
- Size of data is not give

151) We can find the product $A*B$ of matrices A and B , only if they are compatible which means

- No of columns of A must be equal to no of rows B **note: basic rule of mathematics**
- No of columns of A must be equal to no of columns B
- NO of rows of A must be equal to no of rows of B
- Order of A must be equal to order of B

152) Time complexity of chain matrix multiplication is $\Theta(n^3)$ and space complexity is

- $\Theta(n^2)$ **note:- because in general we take 2D Dimensions, but if the dimension is 3D THEN IT WILL BE OPTION B**

- $\Theta(n^3)$
- $\Theta(n \log n)$
- $\Theta(\log n)$

153) The worst running time of algorithm is

- $\Theta(n^6)$
- $\Theta(n^{2n/6})$
- $\Theta(n^2)$ (page 169)
- $\Theta(2n \log 6)$

154) In sieve technique, we know _____

- Item of interest
- Order of items
- Complexity of items
- All items are of interest (page 34)

155) In RAM, instructions are executed

- Five at a time
- Infinite instructions at a time
- One by one (note: by using FIFO Rule)
- Parallel

156) Which of the following is calculated by big theta notation?

- Lower bounds
- Upper bounds (page 24)
- Both lower and upper bounds
- Medium bounds

157) Suppose we have an algorithm which carries out N^2 operation for an input of size N . let us say that a computer takes 1 microsecond to carry out one operation. How does the algorithm run for an input of size 3000?

- 90 seconds

- 9 seconds by using formula $O(\ln n)$
 $O(\ln 3000)$
 $O(8.006)$

- 0.9 seconds
- 0.09 seconds

158) Which one is the best algorithm from the following with respect to running time?

- $\Theta(n)$
- $\Theta(n^2)$ repeated mcqs
- $\Theta(n \log n)$
- $\Theta(n^3)$

159) Which of the following is true?

- The worst case time complexity of the quick sort is $N \log N$
- The best time complexity of the merge sort is $\log N$
- the worst case time complexity of the selection sort is N^2 AS REPEATED IN MANY MCQS. For example Θ is any number which is N so its complexity is its square
- the worst case time complexity of the merge sort is $\log N$

160) We analyze an algorithm to check

It's running time

61) What is the asymptotic growth of $\frac{3}{5} +$

(n^2)

162) What will be result of the following recurrence relation?

$$T(n) = \begin{cases} 4 & \text{if } n=1 \\ 2 & \text{otherwise} \end{cases}$$

$$T(n/5) + 3n \quad \text{if } n \text{ is divisible by } 5$$

then $T(5)$ is

75

163) Divide and conquer involves breaking the problem into a small number of

Sub Problems

164) The sieve technique is a special case where the number of sub problems is just

1

165) When we call heapify then at each level the comparison performed takes time

It will take $O(1)$

166) In quick sort we don't have the control over the sizes of recursion calls

True

The running time of quick sort depends heavily on the selection of

Pivot

167) Any binary tree of height $T(n)$ has at most $2^{T(n)}$ leaves. Thus a comparison base sorting algorithm can distinguish between at most _____ different final outcomes.

$2^{T(n)}$

168) If there are $O(n^2)$ entries in edit distance matrix then each entry $E(i,j)$ takes _____ time to compute.

$O(1)$

169) If there are $O(n^2)$ entries in edit distance matrix then the total running time is

>>>>> $O(n^2)$

170) When a recursive algorithm revisits the same problem over and over again, we say that the optimization problem has ____>>>>

Overlapping

171) A problem exhibits optimal structure if an optimal solution to the problem contains with in it optimal solution to ____

Sub problems

172) The Knapsack problem belongs to the domain of _____ problems

Optimization

173) Computational model of sequential RAM is

Less powerful computation wise then parallel machines

174) Merge sort require

Extra Storage

175) The worst case running time of the algorithm given below is

MAXIMA (int n, point P[1...n])

1 For $i \leftarrow 1$ to n

2 do maximal $\leftarrow$ true

3 do

4 if $(i \neq j) \& (P[i].x \leq P[j].x) \& (P[i].y \leq P[j].y)$

5 Then maximal $\leftarrow$ false break

6 if maximal

7 then output P[i].x, P[i].y

$\Theta(n^2)$

176) Which one is the correct conversion of the given algorithm to sigma notation?

```

1  For  $i \leftarrow 1$  to  $n$ 
2  do maximal  $\leftarrow$  true
3  for  $j \leftarrow 1$  to  $n$ 
4  do
5  if  $(i \neq j) \& (P[i][x] \leq P[j][x]) \& (P[i][y] \leq P[j][y])$ 
6  Then maximal  $\leftarrow$  false break
7  if maximal
8  then output  $P[i].x, P[i].y$ 

```

$$\sum_{i=1}^n 4n+2$$

177) when this relation will be true? $F(n) = O(f(n)^2)$

Always True

178) when of the following function grows fastest as n grows larger?

n^2

Cs502 Solved MCQS for Final Term

Including Current

Quizzes July 2013

Question

Bellman Ford Algorithm applies relaxations to every _____

Vertex of ...

Edge of Graph and repeats this $V-1$ times (p159)

Question

Floyd-Warshall Algorithm is _____

Based on dynamic programming (p161)

Question

Running time of Floyd-Warshall Algorithm is _____

Θn^2

Θn^4

Θn^3 (p164)

Θn
 3^n

Question

Space used by Floyd-Warshall Algorithm is _____

Θn^2 (p164)

Θn

Θn^4

Θn^3

3^n

Question

Huffman encoding Algorithm is a _____

Greedy Algorithm (p99)

Dynamic and Greedy

Question

Graphs cannot be traversed by brute-force technique.

True (p117) False

Question

Brute-force technique is always optimal for Graph traversal.

True

False (p117)

Question

For graph traversal, Breadth-first search strategy _____ is always recursive
Cannot be recursive

Cannot be non-recursive

Can be both recursive and non-recursive

Question

Greedy algorithm can do very poorly for some problems.

True (p97)

False

Question

A greedy algorithm sometimes works well for optimization problems.

True (p97)

False

Question

A greedy algorithm does not work in phases.

True

False (p97)

Question

Greedy algorithm approach solves both 0/1 Knapsack and Fractional Knapsack problems.

True

False

Question

Dynamic Programming approach solves both 0/1 Knapsack and Fractional Knapsack problems.

True

False

Question

In _____ based solution of knapsack problem, we consider 2 cases. Leave object Or Take object.

Brute force

Dynamic programming (p93)

Question

In brute force based solution of knapsack problem, we consider 2 cases. Leave object Or Take object.

True **False (p93)**

Question

In DP based solution of knapsack problem, $V[0, j] =$ _____ if $j \geq 0$ -1

0 (p93)

1

2

Question

In DP based solution of knapsack problem, $V[0, j] = 1$ if $j \geq 0$

True

False (p93)

Question

In Dynamic Programming based solution of knapsack problem, to compute entries of "V". we will imply a(n) _____ approach.

Subjective

Inductive (p93)

Brute force

Combination

Question

In DP based solution of knapsack problem, if we decide to take an object i , then we gain a value of _____. w_{i-1} v_{i-1} w_i

v_i (p93)

Question

In Fractional Knapsack problem, one is allowed to take fraction of an item for _____ for fraction of the weight for fraction of the value

Both, fraction of the weight and value (p109)

None

Question

_____ approach is optimal for the fractional knapsack problem.

Divide and Conquer

Dynamic Programming

Greedy algorithm (p110)

Brute force

Question

In ____ Knapsack Problem, limitation is that an item can either be put in the bag or not-fractional items are not allowed.

0 1 **0/1** Fractional

Question

In Fractional Knapsack problem, the goal is to _____

minimize the value of items without exceeding the total weight limit of W

maximize the value of items without exceeding the total weight limit of W (p109)

minimize the value of items even if exceeding the total weight limit

of W maximize the value of items even if exceeding the total weight
limit of W

Question

In solving Fractional Knapsack problem, we do not
need sorting. True

False (p109)

Question

Suppose that a graph $G = (V, E)$ is implemented using adjacency lists. What is the complexity of a breadth-first traversal of G? Select correct option:

$O(|V|^2)$

$O(|V| + |E|)$

$O(|V|^2|E|)$

$O(|V| + |E|)$ (p116)

Question

For traversing graphs, Breadth-first search can be visualized as a wave front propagating inwards
towards root (or source) node. True

False (p117)

Question

Breadth-first search is **not** a traversal strategy for graphs.

True

False (p119)

Question

Breadth-first search is **not** a popular algorithm technique used for traversing graphs. True

False (p119)

Question

Breadth-first search begins at a root node and inspects all the nodes **except** neighboring ones. True

False (117)

Question

Each time we traverse graph by Breath-first search algorithm, we count the distance from _____

Starting node (p117)

neighbors of
the starting
node right
most node
left most
node

Question

Suppose we are given a set $S = \{a_1, a_2, \dots, a_n\}$ of n activities that are to be scheduled to use some resource. Each activity a_i must be started at a given start time s_i and ends at a given finish time f_i . We want to schedule the largest number of activities on the resource. It is an example of _____.

Searching

Dynamic Programming

Activity selection (p105)

Divide and Conquer

Question

In general, the Activity selection problem is to select a _____
minimum-size set of interfering activities

maximum-size set of mutually non-interfering activities (p105) maximum-size set of interfering activities

minimum-size set of mutually non-interfering activities

Question

In Activity selection (using Greedy approach), intuitively _____

Short activities are not preferable

There are always short activities as input

We do not like long activities (p105)

It does not matter about the length of activities

Question

The activity schedule is a simple scheduling problem for which the _____ approach provides an optimal solution. Dynamic Programming

Graph

Divide and Conquer

Greedy Algorithm (p105)

Question

The activity scheduling is a simple scheduling problem for which the greedy algorithm approach provides a/an _____ solution.

Simple

Sub optimal

Optimal (p105)

Non optimal

Question

A number of lectures are to be given in a single lecture hall. Optimum scheduling for this is an example of Activity selection.

True (p105)

False

Question

In Activity scheduling algorithm, each activity is represented by a _____ Circle

Square

Triangle

Rectangle (p106)

Question

In Activity scheduling algorithm, the width of a rectangle _____ Is always ignored

Directs towards recursion

Should be maximized

Indicates the duration of an activity (p106)

Question

In Activity scheduling algorithm, the time is dominated by sorting of the activities by _____ start times

finish times (p106)

Question

The complexity of Activity scheduling algorithm is _____

☐ $O(n)$

☐ $O(\log n)$

☒ $O(n \log n)$ (p106)

☐ $O(n^2)$

Question

In Activity scheduling algorithm, as base case if there are no activities then Greedy algorithm _____ cannot be optimized is solved using Recursion is transformed into Dynamic Programming **is trivially optimal** (p109)

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data structure (p119)

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#

For _____ problems, greedy approach always gets optimum. Select correct option:

Two

Some (p97)

All

None of the

Question

Fixed-length codes may not be efficient from the perspective of _____ the total quantity of data. **Minimizing (p99)**

Averaging

Maximizing

Summing

Question

There are _____ nested loops in DP based algorithm for computing the minimum cost of chain matrix multiplication.

2

3 (p90)

4

5

Question

Time complexity of DP based algorithm for computing the minimum cost of chain matrix Multiplication is ----. $\log n$ n n^2 **n^3 (p90)**

Question

In greedy algorithm, at each phase, you take the _____ you can get right now, without regard for future consequences.

Worst Minimum Good **Best (p97)**

Question

An optimization problem is one in which you want to find, not just a solution, but the _____ solution.

Simple Good **Best (p97)** Worst

Question

In _____ algorithm, you hope that by choosing a local optimum at each step, you will end up at a global optimum.

Simple Non-Greedy. **Greedy (p97)** Brute force

Question

The string |xyz|, if coded with ASCII code, the message length would be 24 bits.

True False

Question

If the string |lmncde| is coded with ASCII code, the message length would be --- bits.

24 36 **48** 60

Question

If there are n items, there are _____ possible combinations of the items.

2 n **2^n (p92)** 3^n

Question

In Huffman encoding, for a given message string, the frequency of occurrence (relative probability) of each character in the message is determined last.

True **False (p100)**

Question

In DP based solution of knapsack problem, to compute entries of V we will imply a/an _____ approach.

Subjective **Inductive (p93)** Brute force Combination

Question

Inductive approach to compute entries of V is implied in _____ based solution of knapsack problem.

Brute force **Dynamic programming (p93)**

Question

In brute force based solution of knapsack problem, we consider 2 cases, Leave object Or Take object.

True (p93) False

Question

There are _____ nested loops in DP based algorithm for computing the minimum cost of chain matrix multiplication.

2

3

4

5 (not confirm page 90)

Question

Those problems in which Greedy finds good, but not always best is called a greedy_____. Algorithm

Solution

Heuristic (p97)

Result

Question

The Huffman codes provide a method of _____ data efficiently. Reading

Encoding (p99)

Decoding

Printing

Question

Fixed-length codes are known for easy break up of a string into its individual characters.

True (p99) False

Question

The Huffman codes provide a method of _____ data efficiently.

Reading **Encoding (p99)** Decoding Printing

Question

In Huffman encoding, the _____ is the number of occurrence of a character divided by the total characters in the message.

Counting

Parsing

Probability (p100)

Weight

Question

In Huffman encoding, for a given message string, the frequency of occurrence (relative probability) of each _____ in the message is done first.

Word

Space

Digit

Character (p100)

Question

The Huffman algorithm finds a (n) _____ solution.

Optimal (Reference)

Non-optimal

Exponential

Polynomial

Question

The Huffman algorithm finds an **exponential** solution True

False (Reference)

Question

The Huffman algorithm finds a **polynomial** solution True

False (Reference)

Prefix Property:

The codewords assigned to characters by the Huffman algorithm have the property that no codeword is a prefix of any other:

Question

Non-optimal or greedy algorithm for money change takes_____

O(k) (p99) O(kN) O(2k) O(N)

Question

The Huffman codes provide a method of encoding data **inefficiently** when coded using ASCII standard.

True **False (p99)** ☐ The Huffman codes provide a method of encoding data **efficiently**.

Question

The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the **postfix** of any other. True **False**

Question

The codeword assigned to characters by the Huffman algorithm have the property that no codeword is the **prefix** of any other. **True (p101)** False

Question

Using ASCII standard the string “abacdaacacwe” will be encoded with _____ bits Select correct option:

64

128

96 (p101 12x8=96)

120

Question

Using ASCII standard the string abacdaacac will be encoded with _____ bits.

80 (p99) 160 320 100 ○ Consider the string “ abacdaacac”. if the string is coded with ASCII codes, the message length would **be** ○ **$10 \times 8 = 80$ bits.**

Question

Using ASCII standard the string abacdaacac will be encoded with 160 bits.

Question

True

False (p99)

Using ASCII standard the string abacdaacac will be encoded with 320 bits.

Question

True

False (p99)

Using ASCII standard the string abacdaacac will be encoded with 100 bits.

Question

True

False (p99)

Using ASCII standard the string abacdaacac will be encoded with 32 bytes.

True

False (p99)

Question

The greedy part of the Huffman encoding algorithm is to first find two nodes with **smallest** frequency.

True (p100) False

Question

The greedy part of the Huffman encoding algorithm is to first find two nodes with **character** frequency. True **False (p100)**

Question

The greedy part of the Huffman encoding algorithm is to first find two nodes with **larger** frequency. True **False**

Question

Huffman algorithm uses a greedy approach to generate an antefix code T that minimizes the expected length B (T) of the encoded string. True False (p102)

Question

Huffman algorithm uses a greedy approach to generate a postfix code T that minimizes the expected length B (T) of the encoded string. True False (p102)

Question

Huffman algorithm uses a greedy approach to generate a prefix code T that minimizes the expected length B (T) of the encoded string. True (p102) False

Question

Huffman algorithm generates an optimum prefix code.

True (p102) False

Question

A graph is said to acyclic if it contains _____ at least one cycle exactly one cycle always more than one cycle no cycle (p116)

Question

Graph is not a good way to model some sort of "connection" or "relationship" or "interaction" between pairs of objects taken from a set of objects.

True

False (p113)

Question

A graph is not connected if every vertex can reach every other vertex.

True

False (p116)

Question

Traversing a graph means visiting
_____ in the graph. no node

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st
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e
m
or
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a
n
o
n
e
n
o
d
e

every node (p119)

Question

Graphs are important _____ model for many application problems.

Unsystematic

Mathematical (p113)

Haphazard

Unpredictable

Question

In a digraph, the number of edges coming in of a vertex is **not** called the in-degree of that vertex.

True **False (p114)**

Question

In a digraph, the number of edges coming out of a vertex is **not** called the out-degree of that vertex.

True **False (p114)**

Question

For a digraph $G = (V, E)$, Sum of in-degree(v) _____

Not equal to Sum of out-degree(v)

= Sum of out-degree(v) (p115)

< Sum of out-degree(v)

> Sum of out-degree(v)

Question

Graphs **cannot be** represented by an adjacency matrix.

True **False (p116)**

Question

A vertex **a** is **not** adjacent to vertex **b** if there is an edge from a to b.

True **False (p113)**

Question

A **dense undirected** graph is:

Select correct option:

A graph in which $E = O(V^2)$ (Reference)

A graph in which $E = O(V)$

A graph in which $E = O(\log V)$

All items above may be used to characterize a dense undirected graph

Question

What algorithm technique is used in the implementation of **Kruskal solution** for the MST?

Greedy Technique (p142)

Divide-and-Conquer Technique

Dynamic Programming Technique

The algorithm combines more than one of the above techniques

Question

A digraph is strongly connected under what condition?

A digraph is strongly connected if for every pair of vertices $u, v \in V$, u can reach v .

A digraph is strongly connected if for every pair of vertices $u, v \in V$, u can reach v and vice versa. (p135) A digraph is strongly connected if for at least one pair of vertex $u, v \in V$, u can reach v and vice versa.

A digraph is strongly connected if at least one third pair of vertices $u, v \in V$, u can reach v and vice versa.

Question

The relationship between number of back edges and number of cycles in DFS is, Both are equal

Back edges are half of cycles

Back edges are one quarter of cycles

There is no relationship between no. of edges and cycles (p131)

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(u, v) where v is an ancestor of u in the tree. (p128) (u,v) where u is an ancestor of v in the tree.

(u, v) where v is an predecessor of u in the tree.

None of above

Question

Forward edge is?

(u, v) where u is a proper descendent of v in the tree.

(u, v) where v is a proper descendent of u in the tree. (p129) (u, v) where v is a proper ancestor of u in the tree.

(u, v) where u is a proper ancestor of v in the tree.

Question

Edge (u, v) is a forward edge if u is a proper descendant of v in the tree **v is a proper descendant of u in the tree**

None of these

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(u, v) where u and v are not ancestor of one another

(u, v) where u is ancestor of v and v is not descendent of u.

(u, v) where u and v are not ancestor or descendent of one another (p129) (u, v) where u and v are either ancestor or descendent of one another.

Question

If you find yourself in maze the better traversal approach will be? Select correct option:

BFS

BFS and DFS both are valid (p119)

Level order

DFS

Question

In digraph $G=(V,E)$;G **has cycle** if and only if Select correct option:

The DFS forest has forward edge.

The DFS forest has back edge (p131)

The DFS forest has both back and forward edge

BFS forest has forward edge

Question

What is generally true of Adjacency List and Adjacency Matrix representations of graphs?

Select correct option:

Lists require less space than matrices but take longer to find the weight of an edge (v1,v2)

Lists require less space than matrices and they are faster to find the weight of an edge (v1, v2)

Lists require more space than matrices and they take longer to find the weight of an edge (v1, v2) Lists require more space than matrices but are faster to find the weight of an edge (v1, v2)

Question

There is relationship between number of **back edges** and **number of cycles** in DFS Select correct option:

Both are equal.

Cycles are half of back edges.

Cycles are one fourth of back edges.

There is no relationship between back edges and number of cycle (p131)

Question

You have an adjacency list for G, what is the time complexity to compute Graph transpose G^T .? Select correct option:

(V+E) (Reference)

V

.

E

V

E

Question

Although it requires more complicated data structures, **Prim's algorithm** for a minimum spanning tree **is better** than **Kruskal's** when the graph has a **large number** of vertices.

True

False

e

Question

Maximum number of vertices in a Directed Graph may be $|V|^2$

True

False

Question

Dijkstra's algorithm:

Has greedy approach to find all shortest paths

Has both greedy and dynamic approach to find all shortest paths

Has greedy approach to compute single source shortest paths to all other vertices (p154) Has both greedy and dynamic approach to compute single source shortest paths to all other vertices.

Question

Dijkstra's single source shortest path algorithm works if all edges weights are **non-negative** and **there are no negative** cost cycles. True **False**

Question

there are no Dijkstra's single source shortest path algorithm works if all edges weights are **non-negative** and **negative** cost cycles. **True (p159)** False

Question

Dijkstra's single source shortest path algorithm works if all edges weights are **negative** and **there are no negative** cost cycles.

True **False**

Question

Dijkstra's algorithm is operates by maintaining a subset of vertices. **True** False

Question

Floyd-Warshall algorithm is a dynamic programming algorithm; the genius of the algorithm is in the clever recursive formulation of the shortest path problem. **True (p162)** False

Question

Floyd-Warshall algorithm, as in the case with DP algorithms, we avoid recursive evaluation by generating a table for $d_{ij}(k)$

True (p164) False

Question

The term coloring came from the original application which was in **map drawing**. **True (p173)** False

Question

The term "coloring" came from the original application which was in **architectural design**.

True **False**

Question

In the **clique cover** problem, for two vertices to be in the same group, they must be _____ each other.

Apart from Far from Near to **Adjacent to (p176)**

Question

In the clique cover problem, for two vertices to be in the same group, they **must be adjacent** to each other.

True (p176)

False

Question

In the **clique cover** problem, for two vertices to be in the same group, they **must be apart** from each other.

True False (p176)

Question

The difference between Prim's algorithm and Dijkstra's algorithm is that Dijkstra's algorithm **uses a different** key.

True (p156)

False

Question

The difference between Prim's algorithm and Dijkstra's algorithm is that Dijkstra's algorithm **uses a same key**. **True False (p156)**

Question

You have an adjacency list for G , what is the time complexity to compute graph transpose G^T ? **$(V + E)$ (p138)**

Question

Given an adjacency list for G , it is possible to compute G^T in $\Theta(V + E)$ time. **It takes $O(\log V)$ to extract a vertex from the priority queue.**

Question

Overall time for Kruskal is $\Theta(E \log E) = \Theta(E \log V)$ if the graph is sparse. **True (p149)**

Question

An optimization problem is one in which you want to find,

Not a solution

An algorithm

Good solution

The best solution (p97)

Question

Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a large number of vertices.

True

False

Question

If a graph has v vertices and e edges then to obtain a spanning tree we have to delete $v - 1$ edges.

$v -$

$e +$

5

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es

$v + e$

edg

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Question

Bellman-Ford allows negative weights edges and negative cost cycles.

True

False (p159)

- Bellman-Ford allows negative weights edges and no negative cost cycles.

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keep elements in
random positions keep
the algorithm run in
linear order keep the
algorithm run in $(\log n)$
order

keep elements in increasing or decreasing order (p39)

Question

After partitioning array in Quick sort, pivot is placed in a position such that

Values smaller than pivot are on left and larger than pivot are on right (Ref) Values larger than pivot are on left and smaller than pivot are on right

Pivot is the first element of array

Pivot is the last element of array

Question

Dynamic programming algorithms need to store the results of intermediate sub-problems. **True** False

Question

Which statement is true?

If a dynamic-programming problem satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

If a greedy choice property satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

Both of above

None of above

Question

What **general property** of the list indicates that the graph has an **isolated vertex**?

There is Null pointer at the end of list.

The Isolated vertex is not handled in list.

Only one value is entered in the list.

There is at least one null list.

Question

Depth first search is shortest path algorithm that works on **un-weighted** graphs.

True **False (p153)** ○ The **breadth-first-search** algorithm is a shortest-path algorithm that works on **un-weighted graphs**.

Question

Which is true statement?

Select correct option:

Breadth first search is shortest path algorithm that works on un-weighted graphs (p153) Depth first search is shortest path algorithm that works on un-weighted graphs. Both of above are true.

None of above are true.

Question

Shortest path problems can be solved efficiently by modeling the road map as a graph. **True** False

Question

Which is true statement in the following?

Kruskal algorithm is multiple source technique for finding MST.

Kruskal's algorithm is used to find minimum spanning tree of a graph, time complexity of this algorithm is $O(EV)$ Both of above

Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.

Question

Kruskal's algorithm (choose best non-cycle edge) is better than Prim's (choose best tree edge) when the graph has relatively few edges.

True

False

Question

What is the time complexity to **extract a vertex** from the **priority queue** in **Prim's algorithm**? Select correct option:

$O(\log E)$

(V)

$(V+E)$

$O(\log V)$ (p152)

Question

In Prim's algorithm, the additional information maintained by the algorithm is the **length of the shortest edge** from vertex v to points already in the tree.

a) True

b) False

c) unknown

Question

Although it requires more complicated data structures, Prim's algorithm for a minimum spanning tree is better than Kruskal's when the graph has a **large number of vertices**.

a) True

b) False

c) unknown

Question

Which statement is true?

(i) The running time of Bellman-Ford algorithm is $T(VE)$

(ii) Both Dijkstra's algorithm and Bellman-Ford are based on performing **repeated relaxations**

(iii) The 0-1 knapsack problem is hard to solve

Only i

Only iii

Both i and iii

All of these

Question

Which of the following arrays represent **descending (max) heaps**?

- i. [10,7,7,2,4,6] ii.
[10,7,6,2,4,7] iii.
[10,6,7,2,4,6] iv.
[6,6,7,2,4,10]

Only ii

Only iv

Both ii and iv

Both i and iii

Question

Which of the following statement(s) is/are correct?

(a) $O(n \log n + n^2) = O(n^2)$.

(b) $O(n \log n + n^2) = O(n^2 \log 2n)$

(c) $O(c n^2) = O(n^2)$ where c is a constant.
a constant. (e) $O(c) = O(1)$ where c is a constant.

(d) $O(c n^2) = O(c)$ where c is

Only (a) & (e)

Both (c) and (e)

Question

Which of the shortest path algorithms would be most appropriate for finding paths in the graph with **negative edge weights** and **cycles**?

i. Dijkstra's
Algorithm ii.
. Bellman-
Ford
Algorithm.

iii. Floyd Warshall Algorithm

Only ii

Only iii

Both ii & iii

Question

If, in a DFS forest of digraph $G = (V, E)$, $f[u] = f[v]$ for an edge $(u, v) \in E$ then the edge is called **Back edge** Forward edge Cross Edge Tree Edge None of these

Question

Best and worst case times of an algorithm may be same. **True** False

Question

Can an adjacency matrix for a directed graph ever not be square in shape? **Yes** No

Question

Consider the following Huffman Tree. The binary code for the string **TEA** is:

10 00 010

011 00 010

10 00 110

11 10 110

String Encoding	
TEA	10 00 010
SEA	011 00 010
TEN	10 00 110

Question

Can an adjacency matrix for a directed graph ever not be square in shape? Yes **No** ○ No.
since we want to describe the relationship between each node and each other node, we need precisely n^2 matrix entries.

Question

Suppose we have two problems A and B .Problem A is polynomial-time reducible and problem B is NP-complete. If we reduce problem A into B then problem A becomes NP-complete **Yes** No

Question

If a problem is NP-complete, it must also be in NP.

a) True b) False c) unknown

Question

If a problem is in NP, it must also be in **P**.

False (p178) True unknown

Question

If a problem is in NP-complete, it must also be in **NP**.

True False

Cs502 Solved MCQS for MidTerm

Including Current

Quizes

26 May 2013

Question # 1

Word Algorithm comes from the name of the Muslim author:

Abu Ja'far Mohammad ibn Musa al-Khowarizmi. (p7)

Question # 2

Al-Khwarizmi's work was written in a book titled

al Kitab al-mukhtasar fi hisab al-jabr wa'l-muqabalah (p7)

Question # 3

Analysis of Selection algorithm
ends up with, Select correct option:

T(n) (p37)

$T(1/2 + n)$

$T(n/2)$

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

Question # 4

The function $f(n) = n(\log n + 1)/2$ is asymptotically equivalent to $n \log n$. Here Upper Bound means the function $f(n)$ grows asymptotically _____ faster than $n \log n$.

Select correct option:

More

Quiet

Not (p24)

At least

Question # 5

The running time of an algorithm would not depend upon the optimization by the compiler but that of an implementation of the algorithm would depend on it.

Select correct option:

True

False (p13)

Question # 6

After sorting in merge sort algorithm, merging process is invoked.

Select correct option:

True (p27)

False

Question # 7

Asymptotic growth rate of the function is taken over _____ case running time.

Best

Average

Worst (p14)

Normal

Question # 8

In analysis of $f(n) = n(n/5) + n - 10 \log n$, $f(n)$ is asymptotically equivalent to _____.

n

n

n

+

1

n^2 (p23)

Question # 9 $f(n)$ and $g(n)$ are asymptotically equivalent. This means that they have essentially the same _____ for large n .

Results	Variables	Size	Growth
rates (p23)			

Question # 10

Algorithm is concerned with _____ issues.

Macro	Micro 1	Both Macro & Micro (p8)	Normal
-------	---------	------------------------------------	--------

Question # 11

We cannot make any significant improvement in the running time which is better than that of brute-force algorithm.

True	False (p18, p92)
------	-------------------------

Question # 12

In addition to passing in the array itself to Merge Sort algorithm, we will pass in _____ other arguments which are indices.

Two (p28)	Three	Four	Five
------------------	-------	------	------

Question # 13

For the worst-case running time analysis, the nested loop structure containing one “for” and one “while” loop, might be expressed as a pair of _____ nested summations.

1 **2 (p14)** 3 4

Question # 14

The O-notation is used to state only the asymptotic _____ bounds.

Two Lower **Upper (p25)** Both lower & upper

Question # 15

Which of the following is calculated with **big O notation**?

Lower bounds **Upper bounds (p25)**
Both upper and lower bound Medium bounds

Question # 16

The Ω -notation allows us to state only the asymptotic _____ bounds.

Lower (p25) Upper
Both upper and lower bound Medium bounds

Question # 17

The time assumed for each basic operation to execute on RAM model of computation is _____

Infinite Continuous **Constant (p10)** Variable

Question # 18A

If the indices passed to merge sort algorithm are not equal, the algorithm may return immediately.

True

False (p28)

Question #18B

If the indices passed to merge sort algorithm are _____, then this means that there is only one element to sort.

Small

Large

Equal (p28)

Not Equal

Question # 19

Brute-force algorithm uses no intelligence in pruning out decisions.

True (p18)

False

Question # 20

In analysis, the **Lower Bound** means the function grows asymptotically **at least** as fast as its largest term.

True (p24)

False

Question # 21

In analysis, the **Upper Bound** means the function grows asymptotically **no faster** than its largest term.

True (p24)

False

Question # 22

For small values of n, any algorithm is fast enough. Running time does become an issue when n gets large.

True (p14)

Fast

Question # 23

The array to be sorted is not passed as argument to the merge sort algorithm.

True

False (p28)

Question # 24

In simple brute-force algorithm, we give no thought to efficiency.

True (p11) False

Question # 25

The ancient Roman politicians understood an important principle of good algorithm design that is plan-sweep algorithm.

True **False (p27) [Divide and Conquer]**

Question # 26

In 2d-space a point is said to be _____ if it is not dominated by any other point in that space.

Select correct option:

Member Minimal **Maximal (p11)** Joint

Question # 27

An algorithm is a mathematical entity that is dependent on a specific programming language. Select correct option:

True **False (p7)**

Question # 28

Fibonacci sequence was posted by _____

Leonardo Pisano (p73)

Question # 29

$8n^2 + 2n - 3$ will eventually exceed $c_2(n)$ no matter how large we make c_2 .

True (p25) False

Question # 30

If we associate (x, y) integers pair to cars where x is the speed of the car and y is the negation of the price. High y value for a car means a _____ car.

Fast Slow Expensive **Cheap (p11)**

Question # 31

The running time of quick sort depends heavily on the selection of:

No of inputs Arrangement of elements in array

Size of elements **Pivot element (p49)**

Question # 32

Which sorting algorithm is faster?

$O(n^2)$ $O(n \log n)$ **$O(n+k)$ (p58)** $O(n^3)$

Question # 33

Q knapsack problem is called a “0-1” problem, because

Each item must be entirely accepted or rejected (p92)

Question # 34

Which statement is true?

Select correct option:

If a **dynamic-programming problem** satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

If a **greedy choice property** satisfies the optimal-substructure property, then a locally optimal solution is globally optimal.

Both of above (p77, p98) None of above

Question # 35

Merge sort is stable sort, but not an in-place algorithm

True (p54) False

Question # 36

In counting sort, once we know the ranks, we simply _____ numbers to their final positions in an output array. Delete **copy (p57)** Mark _____ arrange

Question # 37

Dynamic programming algorithms need to store the results of intermediate sub-problems. **True (p75)** False

Question # 38

A $p \times q$ matrix A can be multiplied with a $q \times r$ matrix B. The result will be a $p \times r$ matrix C. There are $(p \cdot r)$ total entries in C and each takes _____ to compute.

$O(q)$ **$O(1)$ (p84)** $O(n^2)$ $O(n^3)$

Question # 39

Due to left-complete nature of binary tree, heaps can be stored in

Link list Structure **Array (p40)** None of above

Question # 40

Efficient algorithm requires less computational _____

Memory Running Time **Memory and Running Time (p9)** Energy

Question # 41

Merge sort makes two recursive calls. Which statement is true after these recursive calls finish, but before the merge step?

The array elements form a heap

Elements in each half of the array are sorted amongst themselves

Elements in the first half of the array are less than or equal to elements in the second half of the array

None of the above

Question # 42

Who invented Quick sort procedure?

Hoare Sedgewick Mellroy Coreman

Question # 43

Merge sort requires extra array storage. **True (p54)** False ○ Mergesort is a stable algorithm but **not** an in-place algorithm. It requires extra array storage.

Question # 44

In which order we can sort?

Increasing order only decreasing order only

Increasing order or decreasing order both at the same time

Question # 45

In the analysis of **Selection algorithm**, we make a number of passes, in fact it could be as many as, $T(n)$ $T(n/2)$ **$\log n$ (p37)** $n/2 + n/4$

Question # 46

How much time **merge sort** takes for an array of numbers?

$T(n^2)$ $T(n)$ $T(\log n)$ **$T(n \log n)$ (p40)**

Question # 47A

Sieve Technique applies to problems where we are interested in finding a **single** item from a larger set of ____ **n items (p34)** phases pointers constant

Question # 47B

The sieve technique works in phases as follows. It applies to problems where we are interested in finding a **single** item from a larger set of n items. **(p34)**

Question # 47C

The sieve technique works where we have to find _____ item(s) from a large input.

Single (p34) Two Three Similar

Question # 48

The sieve technique works in _____ as follows

Phases (p34) numbers integers routines

Question # 49

For the heap sort, access to nodes involves simple _____ operations.

Arithmetic (p41) binary algebraic logarithmic

Question # 50

The analysis of Selection algorithm shows the total running time is indeed _____ in n,

Arithmetic geometric **linear (p39)** orthogonal

Question # 51

Slow sorting algorithms run in,

$T(n^2)$ (p39) $T(n)$ $T(\log n)$ $T(n \log n)$

Question # 52

A heap is a left-complete binary tree that conforms to the

Increasing order only decreasing order only **heap order** $(\log n)$ order

Question # 53

For the heap sort we store the tree nodes in

Level-order traversal (p40) in-order traversal pre-order traversal post-order traversal

Question # 54A

In Sieve Technique we do not know which item is of interest **True (p34)** False

Question # 54B

In Sieve Technique, we know the item of interest.

True **False (p34)**

Question # 55

Divide-and-conquer as breaking the problem into a small

number of Pivot Sieve **smaller sub**
problems (p34) Selection

Question # 56

For the sieve technique we solve the problem,

Recursively (p34) mathematically precisely accurately

Question # 57

The reason for introducing **Sieve Technique** algorithm is that it illustrates a very important special case of, **Divide-and-conquer (p34)** decrease and conquer greedy nature 2-dimension
Maxima

Question # 58

Sorting is one of the few problems where provable _____ bounds exists on how fast we can sort, Upper **Lower (p39)** Average log n

Question # 59

Sieve Technique can be applied to selection problem? **True (p35)** False

Question # 60

One of the clever aspects of heaps is that they can be stored in arrays without using any _____

Pointers (p40) constants variables functions

Question # 61

Heaps can be stored in arrays without using any pointers; this is due to the _____ nature of the binary tree, **Left-complete (p40)** right-complete tree nodes tree leaves

Question # 62

How many elements do we eliminate in each time for the Analysis of Selection algorithm? **n / 2 elements (p36)** (n / 2) + n elements n
/ 4 elements 2 n elements

Question # 63

The sieve technique is a special case, where the number of sub problems is just

5 Many **1** (
p34 few

Question # 64

For the Sieve Technique we take time

T(nk) (p34) $T(n / 3)$ n^2 $n/3$

Question # 65

of nodes in a complete binary tree of height h
is Select correct option:

$2^{(h+1)} - 1$

$2 * (h+1) - 1$

$2 * (h+1)$

$((h+1) ^ 2) - 1$

Question # 66

Random access machine or RAM is a/an _____

Machine build by Al-Khwarizmi

Mechanical machine

Electronics machine

Mathematical model (p10)

Question # 67

Analysis of Selection algorithm ends up with,

T(n)

$T(1 / 1 + n)$

$T(n/2)$

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

Question # 68

Continuation sort is suitable to sort the elements in range 1 to k

1. K is Large 2. K is not known 3. K may be small or large **4. K is small (p57)**

Question # 69

Counting sort is suitable to sort the elements in range 1 to k:

K is large **K is small (p57)** K may be large or small None

Question # 70

Continuing sort has time complexity of?

1. $O(n)$ (p58) 2. $O(n+k)$ 3. $O(n \log n)$

Question # 71

Counting sort has time complexity:

$O(n)$ (p58) $O(n+k)$ $O(k)$ $O(n \log n)$

Question # 72

Memoization is _____:

-To store previous results for further use.

-To avoid unnecessary repetitions by writing down the results of recursive calls and looking them again if

needed later. (p74)

-To make the process accurate -None of the above

Question # 73

In Quick sort algorithm, constants hidden in $T(n \lg n)$ are:

Large Medium Not known **Small (Ref)**

Question # 74

Quick sort is based on divide and conquer paradigm; we divide the problem on base of pivot element and:

There is explicit combine process as well to conquer the solution. No work is needed to combine the sub-arrays, the array is already sorted

Merging the subarrays None of above.

Question # 75

In RAM model instructions are executed _____

In Random Access Machine, instructions are executed_____

One after another (p10) Parallel Concurrent Random

Question # 76

In the analysis of Selection algorithm, we eliminate a constant fraction of the array with each phase; we get the **convergent** _____ series in the analysis,

linear arithmetic **geometric (p37)** exponent

Question # 77

_____ is a graphical representation of an algorithm

Σ notation

Θ notation

Flowchart (Ref)

Asymptotic notation

Question # 78

A RAM is an idealized machine with _____ random-access memory.

256MB

512MB

An infinitely large (p10)

100GB

Question # 79

What type of instructions Random Access Machine (RAM) can execute? Choose best answer

Algebraic and logic

Geometric and arithmetic

Arithmetic and logic (p10)

Parallel and recursive

Question # 80

What will be the total number of **max comparisons** if we run **brute-force maxima** algorithm with n elements?

n^2 (p14)

$2n/n$

n

$8n$

Question # 81

What is the solution to the recurrence $T(n) = T(n/2) + n$.

$O(\log n)$

$O(n)$

$O(n \log n)$

$O(n^2)$

Question # 82

Consider the following code:

```
For(j=1; j<n;j++)
```

```

For(k=1; k<15;k++)

    For(l=5; l<n; l++)

        {

            Do_something_constant();

        }

```

What is the order of execution for this code.

O(n)

O(n³)

O(n² log n)

O(n²)

Question # 83

Consider the following Algorithm: Fun(n){ if (n=1) return 1 else return (n * Fun(n-1)) } Recurrence for the above algorithm is: $nT(n-1)+1$ $2T(n-1)+1$

$T(n-1)+cn$

$T(n-1)+1$

Question # 84

Consider the following
 Algorithm: Factorial (n){
 if (n=1) return 1
 else return (n * Factorial(n-1)) }

Recurrence for the following algorithm is:

$$T(n) = T(n-1) + 1$$

$$T(n) = nT(n-1) + 1$$

$$T(n) = T(n-1) + n$$

$$T(n) = T(n(n-1)) + 1$$

Question # 85

What is the total time to heapify?

$O(\log n)$ (p43)

$O(n \log n)$

$O(n^2 \log n)$

$O(\log^2 n)$

Question # 86

When we call heapify then at each level the comparison performed takes time

It will take $\Theta(1)$ (p43)

Time will vary according to the nature of input data

It cannot be predicted

It will take $\Theta(\log n)$

Question # 87

In Quick sort, we don't have the control over the sizes of recursive calls

-True (p49)

-False

-Less information to decide

-Either true or false

Question # 88

Is it possible to sort without making comparisons?

Yes (p57)

No

Question # 89

If there are $\Theta(n^2)$ entries in edit distance matrix then the total running time is

$\Theta(1)$

$\Theta(n^2)$ (p84)

$\Theta(n)$

$\Theta(n \log n)$

Question # 90

For **Chain Matrix Multiplication** we cannot use divide and conquer approach because,

We do not know the optimum k (p86)

We use divide and conquer for sorting only

We can easily perform it in linear time

Size of data is not given

Question # 91

The Knapsack problem belongs to the domain of _____ problems.

Optimization (p91)

NP Complete

Linear Solution

Sorting

Question # 92

Suppose we have three items as shown in the following table, and suppose the capacity of the knapsack is 50 i.e. $W = 50$.

Item	Value	Weight
1	60	10
2	100	20
3	120	30

The optimal solution is to pick

Items 1 and 2

Items 1 and 3

Items 2 and 3

None of these

Question # 93

Theta asymptotic notation for $T(n)$:

Select correct option:

Set of functions described by

: $c_1g(n) \leq f(n)$ for c_1 some constant and $n \geq n_0$

Set of functions described by $c_1g(n) \geq f(n)$ for c_1 some constant and $n \geq n_0$

Theta for $T(n)$ is actually upper and worst case complexity of the code

Set of functions described by: $c_1g(n) \leq f(n) \leq c_2g(n)$ for c_1 and c_2 some constants and $n \geq n_0$

Question # 94

A (an) _____ is a left-complete binary tree that conforms to the heap order.

Heap (page 40)

Binary tree

Binary search tree

Array

Question # 95

A heap is a left-complete binary tree that conforms to the _____

increasing order only
order

decreasing order only

heap order (p40)

(log n)

Question # 96

Consider the following Algorithm: $\text{Fun}(n) \{ \text{if } (n=1) \text{ return } 1 \text{ else return } (n * \text{Fun}(n-1)) \}$ Recurrence for the above algorithm is: Select correct option:

$nT(n-1)+1$

$2T(n-1)+1$

$T(n-1)+cn$

$T(n-1)+1$

Question # 97

The recurrence relation of Tower of Hanoi is given below $T(n) = \begin{cases} 1 & \text{if } n=1 \\ 2T(n-1) & \text{if } n > 1 \end{cases}$ In order to move a tower of 5 rings from one peg to another, how many ring moves are required?

Select correct option: 16 10 **32 (p30)** 31

Question # 98

In Quick Sort Constants hidden in $T(n \log n)$ are

1. Large 2. Medium **3. Small (Reference)** 4. Not Known

Question # 99

In stable sorting algorithm:

One array is used

In which duplicating elements are not handled.

More than one arrays are required.

Duplicating elements remain in same relative position after sorting. (p54)

Question # 100

In in-place sorting algorithm is one that uses arrays for storage:

An additional array

No additional array (p54)

Both of above may be true according to algorithm

More than 3 arrays of one dimension

Question # 101

Which may be a stable sort?

1. Merger 2. Insertion **3. Both above (p54)** 4. None of the above

Question # 102

An in place sorting algorithm is one that uses _____ arrays for storage

1. Two dimensional arrays 2. More than one array
3. No Additional Array (p54) 4. None of the above

Question # 103

Quick sort is _____

- Stable and In place **Not stable but in place (p54)**
Stable and not in place Sometime in place and sometime stable

Question # 104

One Example of **in place** but **not stable** sort is

- Quick (p54)** Heap Merge Bubble

Question # 105

Which may be stable sort?

- Bubble sort Insertion sort **both of above (p54)**

Question # 106

Merge sort is stable sort, but not an in-place algorithm **True (p54)** False

A sorting algorithm is **stable** if duplicate elements remain in the same relative position after sorting. **(p54)**

Inplace (SBHIQ)	Stable (MCBI)
Selection Sort	Merge Sort
Bubble Sort	Counting Sort
Heap Sort	Bubble Sort
Insertion Sort	
Quick Sort	

Question # 107

$8n^2 + 2n - 3$ grows asymptotically at least as fast as **n^2** .

Question # 108

Given a set of points $P = \{p_1, p_2, \dots, p_n\}$ in 2-space, output the set of maximal points of P , i.e., those points p_i such that p_i is not dominated by any other point of P .

True (p11) False

Question # 109

While Sorting, the ordered domain means for any two input elements x and y _____ satisfies only. $x < y$ $x > y$ $x = y$

All of the above (p34) 100%(sure)

While Sorting, the ordered domain means for any two input elements x and y _____ satisfies only. $x < y$ $x > y$ $x = y$

Linear not (sure)

Question # 110

Brute-force algorithm for 2D-Maxima is operated by comparing _____ pairs of points.

All All (p18)

Two

Some

Most

Question # 111

Merge sort is based on ____

All (p18)

Brute-force

Plan-sweep

Axis-sweep

Divide and Conquer

(p27)

Asymptotic growth of plane sweep algorithm for 2-D maxima problem is _____

C $O(n \log n)$

Question # 112

In the statement "if $(P[i].x < P[j].x) \ \& \ (P[i].y < P[j].y)$ ", the number of times elements of P are accessed is ____

1

2

3

4 (p14)

Question # 113

Al-Khawarizmi was a/an....

Artist

Mathematician

Astronomer

Khalifah

Question # 114

In Sorting the key value or attribute ____ from an ordered domain.

Must be

Not always

✓ The key value need not be a number. It can be any object from a totally ordered domain. (p39)

Question # 115

In Selection problem, the Sieve technique works in ____

Non-recursive manner

Constant time

Phases (p34)

One complete go

Question # 116

In max heap (for Heap Sort algorithm), when every time maximum element is removed from top we replace it with _____ leaf in the tree.

Second last

Last (p41)

First

Any

Question # 117

If input "n" is odd, the median will be _____

$(n+1)/2$ (p34)

$n/2$

Question # 118

The function $f(n) = n(\log n + 1)/2$ is asymptotically equivalent to $n \log n$. Here **Upper Bound** means the function $f(n)$ grows asymptotically _____ faster than $n \log n$.

More

Quiet

Not (p23)

At least

The function $f(n) = n(\log n + 1)/2$ is asymptotically equivalent to $n \log n$. Here **lower Bound** means function $f(n)$ grows asymptotically at _____ as fast as $n \log n$.

More

Quiet

Not (p23)

Question # 119

In asymptotical analysis of $n(n - 3)$ and $4n^*n$, as n becomes large, the dominant (fastest growing) term is some constant times _____.

n

+

1

n

-

1

n

n*n (p23)

Question # 120

In asymptotical analysis of $n^*(5 + 2)^{-3}$, as n becomes large, the dominant (fastest growing) term is some constant times ____.

n

+

1

n

-

1

n

n*n

Question # 121

A point p in 2-dimensional space is usually given by its integer coordinate(s)_____. Select correct option:

p.x only

p.y only

p.x & p.z

p.x & p.y (p10)

Question # 122

Algorithm analysts know for sure about efficient solutions for NP-complete problems.

True

False (p9)

Question # 123

In _____ we have to find rank of an element from given input.

Select correct option:

Merge sort algorithm

Selection problem (p34)

Brute force technique

Plane Sweep algorithm

Question # 124

In Heap Sort algorithm, if heap property is violated

_____ Select correct option:

We call Build heap procedure

procedure (p41) We ignore

We call Heapify

Heap property can never be violated

Question # 125

Upper bound requires that there exist positive constants c_2 and n_0 such that $f(n)$ _____ $c_2 n$ for all $n \leq n_0$ Select correct option:

Less than

Equal to or Less than (p25 => for all $n \geq n_0$)

Equal or Greater than

Greater than

Question # 126

A RAM is an idealized **algorithm** with takes an infinitely large random-access memory.

True

False (p10 => A RAM is an idealized **machine)**

Question # 127

In simple brute-force algorithm, we give no thought to efficiency.

True (p11)

False

Question # 128

_____ is one of the few problems, where provable lower bounds exist on how fast we can sort. Select correct option:

Searching

Sorting (p39)

Both Searching & Sorting

Graphing

Question # 129

The total no of arguments passed to merge sort algorithm is _____ 2

3 (p28 => Array itself + two indices)

4

5

Question # 130

While solving Selection problem, in Sieve technique we partition input data _____

In increasing order

In decreasing order

According to

Pivot (p35)

Randomly

Question # 131

The number of accesses to any element of space is **not counted** for the running time calculation of algorithm. True **False (p14)**

Question # 132

In merge sort algorithm, to merge two lists of size $n/2$ to a list of size n , takes _____ time.

Theta (n) (p30)

Theta $\log(n)$

Theta $\log_2(n)$

Theta $n\log(n)$

Question # 133

In Heap Sort algorithm, Heapify procedure is _____ in nature.

Recursive (p43)

Non-Recursive

Question # 134

In Heap Sort algorithm, we call Build-heap procedure _____

Only once

Twice

Thrice

As many times as we need

Question # 135

In merge sort algorithm, we split the array around the _____ index q.

Entring

Mid (p28)

Exiting

Summing

Question # 136

The Iteration method is used for _____

Comparing sorting algorithms only

Solving Recurrence relations (p31)

Merging elements in Merge sort

Dividing elements in Merge sort

Question # 137

Rank of an element can be defined as _____

One minus the number of elements that are smaller

Two plus the number of elements that are greater

One plus the number of elements that are smaller (p34) Two minus the number of elements that are smaller

Question # 138 $f(n)$ is a set of functions such that there exist positive constants c_1 , c_2 and n_0 such that $0 \leq c_1 g(n) \leq f(n) \leq c_2 g(n)$ for all $n \geq n_0$. Then $f(n)$ is asymptotically _____ $g(n)$.

Select correct option:

Less than

Greater than

Equivalent to (p23)

Not equivalent to

Question # 139

Floor and ceiling are _____ to calculate while analyzing algorithms.

Select correct option:

Very easy

Usually considered difficult (p31)

Question # 140

In Heap Sort algorithm, the maximum levels an element can move upward is _____ Select correct option:

Theta (log n) (p43)

Order (log n)

Omega (log n)

O (1) i.e.

Constant time

Question # 141

In Heap Sort algorithm, the total running time for Heapify procedure is _____ Select correct option:

Theta (log n)

Order (log n) (p43)

Omega (log n)

O (1) i.e.

Constant time

Question # 142

In pseudo code, the level of details depends on intended audience of the algorithm.

True (p12)

False

Question # 143

Counting sort assumes that the numbers to be sorted are in the range _____ **1 to k where k is small (p57)**

Cs502 Quiz No1 Complete Solved File

Pseudo code of algorithms are to be read by _____.

Select correct option

Select correct option

half of the input values all possible random values Pivot is input separately values greater than 5

Insertion sort is an in-place sorting algorithm.

Select correct option

True

False

Divide and Conquer

While solving Selection problem, in Sieve technique we partition input data _____

Select correct option

In increasing order

In decreasing order

According to Pivot

Randomly

Call Heapify procedure

Find the number of input elements

In Heap Sort algorithm (using max heap), when every time maximum element is removed from top _____

Select correct option

Has nothing to do with pivot selection

Is Random upon each execution

Greatly influenced by the selection of pivot

$n-1$

n

$n+1$

$n*n$

Select correct option

Quadratic

Linear

Geometric

Space

Execution time Inputs & outputs

Execution time and memory

$f(n) \text{ ____ } c2n$ for all $n \leq n_0$

Select correct option

Less than

Equal to or Less than

Different than Algorithms having O (order) _____ running time are considered to be slow ones.

Select correct option

n

n^2

n^3

Basic

Advance

Normal

The main purpose of mathematical analysis is measuring the _____ required by the algorithm.

into _____

Select correct option

Equal no. of pieces as of input elements

Single piece exactly

Two nearly equal pieces

Select correct option

Comparing sorting algorithms only Solving Recurrence relations

Merging elements in Merge sort

Line

K is large

K is small

K may be large or small

Rank of an element can be defined as _____

Select correct option

One minus the number of elements that are smaller

Two plus the number of elements that are greater

2

3

4

5

In Heap Sort algorithm, the total running time for Heapify procedure is _____

Select correct option

$O(n)$ algorithm

Stable

Complex

Al-Khwarizmi was a/an.....

B **Mathematician**

Select correct option

Sorting

Both Searching & Sorting

Graphing

Recursive

Non-Recursive

While solving Selection problem, in Sieve technique we choose pivot _____

Select correct option

Middle of the array

Array (containing input elements)

Start of the array

$(n+1)/2$

$n/2$

.....of reference is an important fact of current processor technology.

Select correct option

$x < y$

$x > y$

$x = y$

All of the above

item(s) from a large input.

Select correct option Single

Two

$n/3$

$n/4$

The sequence of merge sort algorithm is:

Select correct option Divide-Combine-Conquer

Conquer-Divide-Combine

not

occasionally

In Heap Sort algorithm, we call Build-heap procedure _____ Select correct option

Only once

P is very large

P is undetermined $f(n)$ and $g(n)$ are asymptotically equivalent. This means that they have essentially the same _____ for large n .

Select correct option

Usually considered difficult

Sorting is one of the _____ problems in Computer Sciences.

Select correct option

Least Popular

Is quadratic

Is always Exponential

Is linear

The definition of Theta-notation relies on proving _____ asymptotic bound.

One

Not

Sometimes

Sometimes not

The running time of Quick sort algorithm _____

Memory

Running Time

Memory and Running Time

Energy

We can improve the performance of Quick sort if we can be able

Very easy

Usually considered difficult

We do not need to mathematically prove that for comparisonbased sorting algorithms always takes $\Omega(n \log(n))$ time.

Select correct option

Plane Sweep algorithm

In Quick sort algorithm, we choose pivot _____

Select correct option

Always smallest element

n

$n*n$

n^3

In Heap Sort algorithm, we build _____ for ascending sort.

Select correct option

Two

Three

Four

Five

$n \log n$

n^3

1

2

3

4

Merge sort is based on_____.

Select correct option

Brute-force

Plan-sweep

2

3

4

5

In selection problem, the rank of an element will be its _____ position if we sort the input data.

Select correct option

first

final

Last

1

2

3

4

The O-notation is used to state only the asymptotic _____ bounds.

Select correct option

Two

Constant time

Phases

One complete go

the running time.

Select correct option

Inputs

Outputs

Steps

Tony Hoare

In asymptotical analysis of $n^*(5 + 2) - 3$, as n becomes large, the dominant (fastest growing) term is some constant times _____. Select correct option

n_1

n

$n+1$

$n*n$

Yes

No

Skip input elements somehow

Select two or more pivots

Skip any sub-array completely Eliminate recursive calls

Result of asymptotical analysis of $n(n - 3)$ and $4n*n$ is that _____.

Select correct option $n(n-1)$ is asymptotically Less $n(n-1)$ is asymptotically Greater

Both are asymptotically Not equivalent

Both are asymptotically Equivalent

Median is not useful measure of central tendency of given input set especially when the distribution of values is highly skewed.

Select correct option

True

False

In max heap (for Heap Sort algorithm), when every time maximum element is removed from top we replace it with _____ leaf in the tree.

Select correct option

Second last

Last

First

Any

In Heap Sort algorithm, every time the maximum element is removed _____

Select correct option

Do not uses Divide and Conquer approach

Eliminates undesired data items each time

Bubble sort is not an in-place sorting algorithm.

Select correct option

Mid

Selection algorithm takes theta _____

Select correct option

(n²)

(n)

False

Upper bound requires that there exist positive constants c_2 and n_0 such that

$f(n) \leq c_2 n$ for all $n \leq n_0$

Select correct option

Equation

Symbolic

For average-case time analysis of Quick sort algorithm, Pivot selection is on average basis from

Select correct option

Smallest element from input

Rank of the pivot

Largest element from input

The sieve technique works where we have to find _____

Two

half of the input values

all possible random values

Pivot is input separately

values greater than 5

Sorting can be in _____

Select correct option

Increasing order only Decreasing order only

Both Increasing and Decreasing order

Quick sort is a recursive algorithm.

Select correct option

True

False

We call merge Sort algorithm It becomes Order n^2 Algorithm

Divide and Conquer strategy helps us

Transitive

Non Transitive

Equation

due to _____

Select correct option

Using Decrease and Conquer strategy Avoiding to sort all input data

Eliminating Rank of an element

Largest element from input