GeeksQuiz

Computer science mock tests for geeks

Analysis of Algorithms (Recurrences)

Question 1

What is the value of following recurrence.

```
T(n) = T(n/4) + T(n/2) + cn^2
T(1) = c
T(0) = 0
```

Where c is a positive constant

A O(n^3)

B O(n^2)

C O(n^2 Logn)

D O(nLogn)

Discuss it

Question 2

What is the value of following recurrence. T(n) = 5T(n/5) + $\sqrt{n}$, T(1) = 1, T(0) = 0

A Theta (n)

B Theta (n^2)

C Theta (sqrt(n))

D Theta (nLogn)

Discuss it

Question 3

What is the worst case time complexity of following implementation of subset sum problem.

```
// Returns true if there is a subset of set[] with sun equal to given sum
bool isSubsetSum(int set[], int n, int sum)
{
   // Base Cases
   if (sum == 0)
     return true;
   if (n == 0 && sum != 0)
     return false;

   // If last element is greater than sum, then ignore it
   if (set[n-1] > sum)
     return isSubsetSum(set, n-1, sum);

   /* else, check if sum can be obtained by any of the following
      (a) including the last element
      (b) excluding the last element   */
   return isSubsetSum(set, n-1, sum) ||
          isSubsetSum(set, n-1, sum-set[n-1]);
}
```

A O(n * 2^n)

B O(n^2)

C O(n^2 * 2^n)

D O(2^n)

Discuss it

Question 4

Suppose T(n) = 2T(n/2) + n, T(0) = T(1) = 1 Which one of the following is false. (GATE CS 2005)
a)T(n) = O(n^2)
b)T(n) = θ(nLogn)
c)T(n) = Ω(n^2)
d)T(n) = O(nLogn)

A A

B B

C C

D D

Discuss it

Question 5

Consider the following recurrence:

$$T(n) = 2T\left(\lceil \sqrt{n} \rceil\right) + 1, T(1) = 1$$

Which one of the following is true?

(A) T(n) = θ(loglogn)
(B) T(n) = θ(logn)
(C) T(n) = θ(sqrt(n))
(D) T(n) = θ(n)

A A

B B

C C

D D

Discuss it

Question 6

The running time of an algorithm is represented by the following recurrence relation:

```
if  n <= 3  then   T(n) = n
else T(n) = T(n/3) + cn
```

Which one of the following represents the time complexity of the algorithm?
(A) θ(n)
(B) θ(n log n)
(C) θ(n^2)
(D) θ(n^2log n)

A A

B B

C C

D D

Discuss it

Question 7

The running time of the following algorithm

```
Procedure A(n)
If n <= 2 return(1) else return A(⌈√n⌉);
```

is best described by

A O(n)

B O(log n)

C O(1og log n)

D O(1)

Discuss it

Question 8

What is the time complexity of the following recursive function:

```
int DoSomething (int n)
{
  if (n <= 2)
    return 1;
  else
    return (DoSomething (floor(sqrt(n))) + n);
}
```

(A) θ(n)
(B) θ(nlogn)
(C) θ(logn)
(D) θ(loglogn)

A A

B B

C C

D D

Discuss it

Question 9

The time complexity of the following C function is (assume n > 0 (GATE CS 2004)

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

A 0(n)

B 0(nlogn)

C 0(n^2)

D 0(2^n)

Discuss it

Question 10

Consider the following recurrence T(n) = 3T(n/5) + lgn * lgn What is the value of T(n)?
(A) $\Theta(n^{\log_5 3})$
(B) $\Theta(n^{\log_3 5})$
(c) $\Theta(nLogn)$
(D) $\Theta(Logn)$

A A

B B

C C

D D

Discuss it

Question 11

Consider the following recurrence. T(n) = T($\sqrt{n}$) + $\Theta(LogLogn)$ What is the value of recurrence?
(A) $\Theta((LogLogn)^2)$
(B) $\Theta(LogLogn)$
(B) $\Theta(n)$
(B) $\Theta(LogLogLogn)$

A A

B B

C C

D D

Discuss it

Question 12

Which one of the following correctly determines the solution of the recurrence relation with T(1) = 1?

```
T(n) = 2T(n/2) + Logn
```

A Θ(n)

B Θ(nLogn)

C Θ(n*n)

D Θ(log n)

Discuss it

Question 13

$$T(1) = 1$$
$$T(n + 1) = T(n) + \lfloor \sqrt{n+1} \rfloor \text{ for all } n \geq 1$$

Consider the following recurrence relation The value of $T(m^2)$ for $m \geq 1$ is

A $(m/6)\ (21m - 39) + 4$

B $(m/6)\ (4m^2 - 3m + 5)$

C $(m/2)\ (m^{2.5} - 11m + 20) - 5$

D $(m/6)\ (5m^3 - 34m^2 + 137m - 104) + (5/6)$

Discuss it

Question 14

The solution to the recurrence equation $T(2^k) = 3\ T(2^{k-1}) + 1$, $T(1) = 1$, is:

A 2^k

B $(3^{k+1} - 1)/2$

C $3^{\log 2k}$

D $2^{\log 3k}$

Discuss it

Question 15

Select the correct asymptotic complexity of an algorithm with runtime T(n, n) where

```
T(x, c) = 0(x) for c <= 2,
T(c, y) = 0(y) for c <= 2, and
T(x, y) = 0(x+y) + T(x/2, y/2)
```

A $\Theta(n\text{Log}n)$

B $\Theta(n^2)$

C $\Theta(n)$

D $\Theta(n^2\text{Log}n)$

Discuss it

Question 16

Let f(n) = n and g(n) = $n^{(1+\sin n)}$, where n is a positive integer. Which of the following statements is/are correct?

```
I.  f(n) = O(g(n))
II. f(n) = Ω(g(n))
```

A Only I

B Only II

C Both I and II

D Neither I nor II

Discuss it

There are 16 questions to complete.