ELMASHREQ COLLAGE OF SCIENCS AND TECHNOLOGY

2nd Semester _final exam –august 2011

class :- 2nd year	**SE2 + IT2**	**sub :- algorithm analysis**
date :25/ 8 /2011	**no of pages :- 4**	**time :- 3 hours**

Answer all questions (4 Qs)

السؤال الاول الاجابة على ورقة الاسئلة

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Question one :-

1- **Complete the following-**:

A. If $T_1(n) = O(f(n))$ و $T_2(n) = O(f(n))$ then

1- $T_1(n) + T_2(n)$ = _____

2- $T_1(n) * T_2(n)$ = _____

B. A function is said to be in O(f(n)), denoted $T(n) = O(f(n))$, $n > 0$ if there exist n_0 و c positive constants ,such that……..

C. A function is said to be in Ω (f(n)), denoted $T(n) = \Omega(f(n))$ و $n > 0$ if there exist n_0 and c, positive constants ,such that……..

D. A function is said to be in Θ (f(n)), denoted $T(n) = \Theta(f(n))$ و $n > 0$ if there exist n_0 and c_1, c_2 positive constants ,such that……..

2- **Put a circle round the correct answer:**

1- binary search algorithm is application of :

2- Divide and conquer technique	1- Decrease and conquer
4- All are wrong	3- Greedy technique

2- Efficiency class of multiplication of two dimension matrices is :

2- $O(n^3)$	1- O(n)
4- O (n log n)	3- $O(n^2)$

3- the rate of growth for an algorithm is $T(n) = \sum_{i=0}^{n} d$, ,it's efficiency class

2- O (n)	1- $O(n^3)$
4- O (n log n)	3- $O(n^2)$

4- the rate of growth for an algorithm $T(n)=\sum_{i=1}^{n}\sum_{j=1}^{n} d$ it's efficiency class

2- O (n^3)	1- O(n)
4- All are wrong	3- O (n^4)

5- The worst-case for the algorithm of Searcing an element in array of size n^2 , is

2- One comparison Operation	1- n/2 Operations
4- $\frac{n(n-1)}{2}$ Operations	3- N^2 Operations

6- A sequential search algorithm is application of

2- Divide and conquer technique	1- Decrease and conquer
4- All are wrong	3- Greedy technique

7- for The following algorithm

```
for i = 1 to n do
        Begin
              j = i div 2
         end
end for
```

The efficiency class is :

2- O (n^3)	1- O(n)
4- O (n log n)	3- O (n^2)

8- the growth rate of the algorithm defined the relationship

$$T(n)=\begin{cases} T(n-1) & , n>1 \\ 1 & , n=1 \end{cases}$$

The efficiency class is:

2- O (n^3)	1- O(n)
4- O (n log n)	3- O (n^2)

9- design method characterized by brute force it:

2- smart	1- easy to use
4- Answers 1 and 3	3- many uses

10 - A selection sort algorithm is application of

2- Divide and conquer technique	1- Decrease and conquer
4- All are wrong	3- Greedy technique

السؤال الثاني :-

1- Prove the following :

a- ½n(n+1)= Ω (n^3)

b- b- ½n(n+1)= Θ(n^2)

2- Find a solution the sequence: $\sum_{i=1}^{N} (3i + 7)$

3- Arranged the following growth rates upward ?.

n logn	$n+n^2+n^3$	n^3+logn	2^n	$n^2 \sqrt{n}$
logn	n^3	n	n!	$(½)^n$

QUESTION 3:-

1. Write any algorithm to find a common divider of two numbers ?
2. Put in summation notation the following loops :

```
For j = 1  to n do
 Print ( j )
```

Then find efficiency class O(f(n)) of it ?

3. Using the Euclidean algorithm Find gcd (138 , 75) with the writing of all steps
4. A growth rate of a iterative algorithm is T(n)= ∑c , i=1 to n , and c is constant , find it's efficiency class O(f(n)) .

QUESTION 4 :

1- Consider the following algorithm :

```
Algorithm test1(n)
 // input : n integer ,
 S=0
For i=1 to n do
   S = s + i*i*i
Return s
```

a- What does this algorithm compute ?

b- What is its basic operation ?

c- How many times is the basic operation executed?

d- efficiency class of this algorithm ؟

لها :- O(f(x)) المطلوب حساب 2n×n-الخوارزمية التالية لحساب حاصل جمع مصفوفتين

```
For i= 1 to n do
 For j= 1 to n do
      C_ij = A_ik + B_kj
```