Group Assignment 1, Due: Sep 6, 22.00.

Typed document or Hand-written and scanned to .pdf must be emailed to assignment.iiitdm@gmail.com

for 1 and 2 2nd logic left

1. Present two different logic for (i) Odd coin out problem using physical balance (ii) Odd coin out problem using electronic balance (ii) Identifying first infinity in an infinite array.
2. For each logic, present its analysis using asymptotic notations; big-oh, big-omega, theta.
3. Given an integer, the objective is to find 'all its prime factors'. Present an algorithm and its step-count analysis and asymptotic analysis using O, Ω, Θ notation. asymtotic analysis left
4. For each of the following step count function, write all asymptotic notation ($O, \Omega, \Theta, o, \omega$
   (a) $2n^3 + 40n - 415$
   (b) $2^n + n^2 1.5^n + 100^n$
   (c) $n^k + 2^n + 4^n$, k is a fixed integer (for example, 100, 200, 1024...)
   (d) $n^k + c^n$, $k > 1$, $c > 1$ are fixed real numbers.
   (e) $n^2 + \frac{1}{n^2}$
   (f) $5 + \frac{1}{n}$
   (g) 50

found an algorithm

5. Write a recursive algorithm for (i) $a + b$ (ii) $a * b$ (iii) $\frac{a}{b}$. Analyse its time complexity using recurrence relations. Present the tight asymptotic analysis. (theta notation)
6. Identify $f(n)$ and $g(n)$ such that $f(n) \neq O(g(n))$ and $f(n) \neq \Omega(g(n))$.
7. Write an iterative algorithm to find base r representation of a decimal number n. Analyse its time complexity using O, Ω, Θ. algo done, analysis left
8. Given an integer array A and an integer x, the objective is to search x in A using (a) Linear Search (b) Binary Search. Assuming $x \notin A$, what is the best and worst case analysis of the above search strategies. Assuming $x \in A$, what is the best and worst case analysis of the above search strategies.
9. Arrange the following in non-decreasing order of its asymptotic growth. n^3, $4^{\log_2 n}$, 1.5^n, $2^{n \log_2 n}$, n^n, n^{100} need to dicuss
10. A program has three modules; the time complexities of modules are $O(n^2), \Omega(n^2), \Theta(n^2)$. What is the overall time complexitity of the program. Present O, Ω, Θ if exists.
11. Arrange the following in increasing order; $n^{O(1)}, n^{\Omega(1)}, n^{\Theta(1)}$