



EAST WEST UNIVERSITY

Department of Computer Science and Engineering

B.Sc. in Computer Science and Engineering Program

Mid 1 Examination, Spring 2022 Semester

Course: CSE246 Algorithm, Section-03
Instructor: Jesan Ahammed Ovi, Senior lecturer, CSE Department
Full Marks: 25 (15 will be considered for final grading)
Time: 1 Hour 20 Minutes (Writing) plus 10 Minutes (Uploading)

Note: There are FIVE questions, answer ALL of them. Course Outcome (CO) and Mark of each question are mentioned at the right margin.

1. Consider the following recursive relation. **Analyze** the complexity of the following recursive relation using a suitable technique. [CO4, C4, Marks: 5]

$$T(n) = \begin{cases} C & ; n = 1 \\ 3 * T\left(\frac{n}{3}\right) + n + C & ; n > 1 \end{cases}$$

Here C is constant and n is the input size.

2. Consider the following statement. **Execute** Hoffman algorithm to generate variable length code for each character. Show details of your calculation. [CO3, C3, Marks: 5]

TOO COOL TO SLEEP

3. Mr. Thorin a famous researcher who visits different place and record the temperature of that place. As he uses to visit different place of the world, temperature he recorded can be both positive and negative. He stored the value of the temperature in consecutive way like {-1, 5, 20, -18, -5, 33, 24}. Now he wants know maximum continuous subset that has maximum sum. See following example for better understanding. [CO3, C4, Marks: 5]

For example, if the given array is {-2, -5, 6, -2, -3, 1, 5, -6}, then the maximum subarray sum is 7 that is made by {6, -2, -3, 1, 5}.

You are given the temperature of n places. Your task is to **design** an efficient algorithm using a suitable design technique that find the continuous subset having maximum sum. Worst case run time complexity of your algorithm can not be more than $n \log n$.

4. Consider the following String S and Pattern P. **Use** Rabin-Karp algorithm to find each occurrence of pattern P in string S. [CO2, C3, Marks: 5]

S = 1011001001000101

P = 1001

Use Horner's rule for generating integer.

5. For solving a particular problem, two students come with their own solutions. Core [CO4, C4, part of their solution is given bellow. **Choose** more efficient solution between them. Marks: 5]
Show details of your calculation.

<p>Solution 1:</p> <pre>for(i = -10 ; i <= n/3 ; i++){ for(j = 1 ; j <= m ; j = j*2){ sum++ ; } }</pre>	<p>Solution 2:</p> <pre>for(i = -1 ; i <= n/3 ; i++){ j = m ; while(j >= 1){ sum++ ; j = j-2 ; } }</pre>
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