



EAST WEST UNIVERSITY

Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Mid Term I Examination, Spring 2022 Semester

Course	CSE 246 Algorithms, Section 04
Instructor	Redwan Ahmed Rizvee
Full Marks	30 (Will be converted to 15)
Time	1 hour 20 minutes
Date	March 09, 2022

Note:

- 1. Answer all the questions.**
- 2. You must use a functional webcam and microphone**
- 3. Your desk/table must be clear or any materials except your test-taking stuffs, pen and paper**
- 4. No one else can be in the room with you**
- 5. No talking**
- 6. The testing room must be well-lit and you must be clearly visible**
- 7. Share your screen (if asked)**
- 8. Keep your camera or webcam open always**
- 9. You cannot leave during exam**
- 10. No use of additional applications or internet**
- 11. For late submission marks will be deducted**

1		CO1
	Look at the following code segment. Determine the complexity of the code.	Marks 1

	<pre> for(int i = 1; i <= n; i=i++){ for(int j = 1; j<=n; j=j*2) { //..... } } </pre>	
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2		CO1																
	<p>You are in a grid cell (i,j). You can move from your current cell according to the ways shown in the following figure. The color cells denote the next possible cells where you can move. Write the color cells' relative positions from (i,j) using the variable (i,j).</p> <table><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td></td><td>(i,j)</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>										(i,j)							Marks 1
	(i,j)																	

3		CO1
	<p>You are given two strings X = "ABABCA", Y="BBABAC". Identify the longest common subsequence length between X and Y.</p> <p>a) 2 b) 3 c) 4 d) 5</p>	Marks 2

4		CO3
	<p>Suppose, you are solving the counting inversion problem using merge sort. At a particular stage, you have a left array L containing elements $L = \{1, 5, 7, 9\}$ and a right array R containing elements $R = \{2, 4, 6, 8\}$.</p> <p>In this particular stage or level, determine how many inversions are possible. You need to write the calculation for each element. In the counting inversion problem, as per the definition, an inversion occurs when $i < j$ and the value of the i^{th} index is greater than the value in the j^{th} index.</p>	Marks 2

5		CO3
	<p>You are given an array $A = \{1, 3, 5, 7, 9\}$. You will apply the quick sort over this array always considering the ending element as the pivoting element in each partition. Identify the steps of how the quick sort algorithm will partition the array considering the fixed condition.</p>	Marks 4

6		CO4
	<p>You will be given a value N. You need to design an algorithm to approximate up to two decimal places of \log_2^N. As we are approximating the <i>log</i> function, you can not use the built-in math function <i>log</i> in your solution.</p>	Marks 4

7		CO4
	<p>You will be given a set of coins $S = \{1, 2, 5, 6, 7\}$ and an amount K. You need to use the minimum number of coins to construct the amount K. You can use each coin multiple times. Determine and justify your</p>	Marks 4

	approach to solve the problem. You can use examples to state your arguments. You do not need to write the pseudo-code.	
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8		CO3
	You will be given an array of positive integers A and a value K. You need to determine if it is possible to construct K using the integers of array A. You can not use an element multiple times and you do not need to use all of the elements (You can choose a subset of elements). Design the recursive dynamic programming approach to solve this problem.	Marks 4

9		CO4
	<p>You are given an array A = {1, 8, 3, 6, 5, 4, 2} and a code to sort the array. Look at the code given below,</p> <pre> int A[] = {1, 8, 3, 6, 5, 4, 7, 2}; int n = 8; for(int i=1; i<n; i=i+2){ swap(A[i], A[n-i]); } </pre> <p>Here the swap operation denotes swapping the values of the concerned indexes. Does this algorithm sort the given array? Determine and Justify your answer.</p>	Marks 4
10		CO4
	Look at the following code segment. Determine and justify the complexity of the code.	Marks 4

	<pre>for(int i = 0; i < n; i++){ while(i>=0) { i = i/2; // } }</pre>	
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The End