

Name: \_\_\_\_\_

Q1. Consider the following problem. Given an array  $A[1..n]$  of integers, test each element ' $a[i]$ ' in  $A$  to see whether it is even or odd. If ' $a$ ' is even, then leave it; otherwise multiply it by 2. (30)

- Write a pseudo-code of the algorithm stated above. (10)
- Identify and describe the input metric (3)
- Identify the basic operation. (3)
- Derive expressions for the best-case and worst-case computational complexity of the algorithm, as a function of the input metric selected. (For the purpose of counting the number of operations performed as the indicator of the algorithm's efficiency, consider addition and subtraction arithmetic operations to be in one class and all the other operations to be in another single class.) (8)
- Determine the asymptotic expression of the algorithm's efficiency. (6)

[illegible]

CO1

[illegible]

Q3.

[illegible]

Q4. Show that  $T(n) = (2n^2 + 3n + 1) \in \Theta(n^2)$ . (20)

**CO5** (hint: Find  $(c_1, c_2, n_0)$  such that  $c_1 n^2 \leq (2n^2 + 3n + 1) \leq c_2 n^2$ , for every  $n \geq n_0$ )

[illegible]

Q5. You are given two input arrays A and B, as stated below. (5, 15)

**CO4** A[] = {2, 7, 25, 27, 81, 91}, B[] = {1, 3, 12, 32, 74, 89}

(i) What basic operation would you perform to combine the two arrays into a single ordered array?

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(ii) Determine the number of basic operations you would perform to combine A and B. Please detail below how you arrived at this number for the basic operations.

[illegible]