

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

J#: \_\_\_\_\_

**CSC 323 Algorithm Design and Analysis, Spring 2020**

**Instructor: Dr. Natarajan Meghanathan**

**Assignment 11 (Take Home): Matrix Chain Multiplication**

**Total: 100 points**

**Due: April 9th, 2020** (11.59 PM, in Canvas). Upload either a scanned PDF version of your handwritten solution or a word document (with the solution typed).

You are given a chain of six matrices that need to be multiplied.

$A_1 \times A_2 \times A_3 \times A_4 \times A_5 \times A_6$

Note that the dimension vector for this chain will be  $[p_0, p_1, p_2, p_3, p_4, p_5, p_6]$  such that the dimensions of the matrices are as follows:

$A_1$   $p_0 \times p_1$   
 $A_2$   $p_1 \times p_2$   
 $A_3$   $p_2 \times p_3$   
 $A_4$   $p_3 \times p_4$   
 $A_5$   $p_4 \times p_5$   
 $A_6$   $p_5 \times p_6$

The dimension vector 'p' is assigned for each of you below. You need to work out the Dynamic Programming algorithm in detail (as shown in the lecture notes) for each spread value.

- (1) Determine the minimum number of multiplications needed to execute the chain  $A_1 \times \dots \times A_6$ .
- (2) Show the final parenthesization of the chain that would lead to the minimum number of multiplications reported for (1).
- (3) Show how would you cross-check (1) and (2) as explained in the lecture notes.
- (4) Use the Dynamic programming tables obtained to identify the minimum number of multiplications needed to execute  $A_2 \times \dots \times A_5$ .
- (5) Show the final parenthesization of  $A_2 \times \dots \times A_5$  that would lead to the above minimum number of multiplications reported for (4).
- (6) Show how would you cross-check (4) and (5) as explained in the lecture notes.

Student Name	p0	p1	p2	p3	p4	p5	p6
Abate, Biruk	4	10	15	12	3	8	17
Akintade, Oluwaseun	12	5	8	9	11	17	16
Alharbi, Abdullah	8	7	15	20	13	6	9
Alharbi, Abdulmajeed	5	12	6	14	10	7	15
Atkins, Nayaa	10	12	4	8	6	3	12
Barnett, Isaiah	3	12	5	10	6	18	11
Dent, Kaitlyn	12	14	18	5	7	9	11
Drake, Keilah	10	20	15	8	6	4	13
Harris, Chawne	8	12	14	8	6	13	10
McGee, Bria	9	12	15	10	14	8	7
Rankin, Simeon	12	13	5	8	9	17	6
Redmond, Brandon	5	9	4	10	12	13	15
Roberts, Cambria	8	7	12	10	15	16	11
Stubbs, Jasmine	6	5	7	8	9	10	11

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Swami, Shaurya	8	9	10	12	5	7	13
Tchakoua, Landrie	8	10	7	5	6	4	3
Teshome, Nahom	9	5	4	3	6	7	5
Triplett, Marzell	2	5	7	4	6	9	8
Wilkes, Kayla	6	5	4	8	9	7	4