

**East West University**  
**Department of Computer Science and Engineering**

**CSE106 Discrete Mathematics**  
**Mini-Project**

**CO:** CO3, CO4

**EP/EA:** EP1, EP2

**Cognitive Learning Level:** C3

**Psychomotor Learning Level:** P3

**Affective Learning Level:** A2

**Mini Project 1 (for odd group number)**

1. Using C program, randomly generate a directed graph represented by adjacency matrix with  $n = 1000$  vertices.
2. Determine in-degrees and out-degrees of all vertices and show that sum of in-degrees and sum of out-degrees are equal. Determine computational time in this step (except printing time) in ms.
3. Repeat steps 1 and 2 for  $n = 2000$ ,  $n = 3000$ ,  $n = 4000$ , and  $n = 5000$ .
4. Using Microsoft Excel Worksheet, draw a line graph showing computational time vs.  $n$ . In the line graph, select Add Trendline. In the Trendline Options, select Polynomial. Select the Order value that mostly matches your graph. Then select Display Equation on Chart. From the displayed equation, determine the time complexity of your program as a function of  $n$ .
5. Theoretically determine the computational time complexity of your program as a function of  $n$  and compare that with the time complexity found in step 4.
6. Give a 5-minute power point presentation on your mini project on the specified date and time.
7. Submit (i) the C source code, (ii) a 3-page report, and (iii) the power point presentation within the submission deadline. This submission will be group-based.

**Mini Project 2 (for even group number)**

1. Using C program, randomly generate an undirected graph represented by adjacency matrix with  $n = 1000$  vertices.
2. Determine number of edges in the graph. Determine degrees of all vertices. Show that Handshaking logic holds. Determine computational time in this step (except printing time) in ms.
3. Repeat steps 1 and 2 for  $n = 2000$ ,  $n = 3000$ ,  $n = 4000$ , and  $n = 5000$ .
4. Using Microsoft Excel Worksheet, draw a line graph showing computational time vs.  $n$ . In the line graph, select Add Trendline. In the Trendline Options, select Polynomial. Select the Order value that mostly matches your graph. Then select Display Equation on Chart. From the displayed equation, determine the time complexity of your program as a function of  $n$ .

5. Theoretically determine the computational time complexity of your program as a function of  $n$  and compare that with the time complexity found in step 4.
6. Give a 5-minute power point presentation on your mini project on the specified date and time.
7. Submit (i) the C source code, (ii) a 3-page report, and (iii) the power point presentation within the submission deadline. This submission will be group-based.

**Note: Each group will consist of 3 students.**

**Mark Distribution:**

1. Program accuracy and quality (Cognitive: C3):	3.0
2. Report quality (Cognitive: C3):	1.0
3. Report quality (Psychomotor – communication skill: P3):	0.5
4. Presentation quality (Cognitive: C3):	4.0
5. Presentation quality (Psychomotor – communication skill: P3):	0.5
6. Presentation quality (Affective: A2):	0.5
7. Question-answer (Affective: A2):	0.5
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Total:	10.0