

CMSC 341 Data Structures

Graph Review

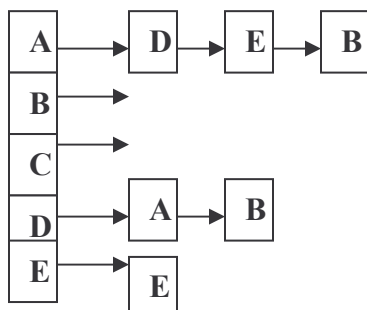
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1. Define the following terms:
 - a. Graph
 - b. Weighted graph
 - c. Directed graph
 - d. Undirected graph
 - e. Path
 - f. Length of a path
 - g. Sparse graph
 - h. Dense graph
 - i. Connected undirected graph
 - j. Weakly connected directed graph
 - k. Strongly connected directed graph
 - l. Adjacency matrix
 - m. Adjacency list
 - n. Directed Acyclic Graph
 - o. Topological ordering
 - p. Cycle
2. Let $G = (E, V)$ be an undirected graph. Let $v_1, v_2, v_3, \dots, v_p$ be the members of V , and let $q = |E|$ (the cardinality of E). Prove that the sum of the degrees of all the vertices is equal to $2q$.
3. Write pseudo-code for the breadth-first and depth-first traversals of an undirected graph.
4. Given the drawing of a graph, list the breadth-first and depth-first traversals of the graph.
5. Describe, in English, an *adjacency matrix* graph implementation. How does an adjacency matrix differ for directed and undirected graphs?

6. Describe, in English, an *adjacency list* graph implementation. How does an adjacency matrix differ for directed and undirected graphs?
7. Given the drawing of a directed or undirected graph, show its representation in an adjacency matrix or adjacency list.
8. Draw the weighted directed graph represented by the adjacency matrix below. A non-zero value at [row, column] indicates that the vertex in the row is "adjacent to" the vertex in the column

	A	B	C	D	E
A	0	5	8	0	0
B	3	0	6	0	0
C	0	3	4	1	0
D	0	6	7	0	0
E	0	0	0	0	0

9. Given the drawing of a(n) (un)directed graph, show its representation in an adjacency list.
10. Draw the directed graph represented by the adjacency list below. Each element in a vertexes' list is adjacent to the vertex.



11. Given the drawing of a graph, find all cycles.
12. Discuss the characteristics of the adjacency matrix and adjacency list implementations for a graph. Include storage requirements and worst-case performance for all graph operations.