Workshop 8 – Week 9 – Worksheet 9

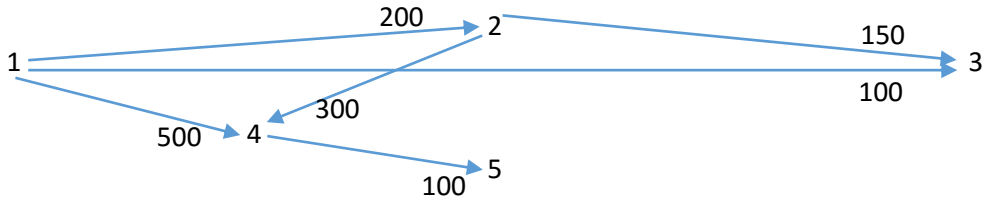
Question 9.1 In this question, you are asked to construct weighted graphs from records whose format is vertex, vertex', weight.

For example, in a weighted, directed graph, the record 1, 3, 500 means that there is an edge from vertex 1 to vertex 3 with weight 500.

The following questions all refer to the input data below

1 2 200
1 3 100
1 4 500
2 3 150
2 4 300
4 5 100

1. Draw a weighted directed graph that reflects these edges and weights (logical representation).



2. Construct an adjacency matrix for the weighted digraph you have just drawn, including the weights. Be explicit about how you are going to handle matrix cells for which there is no information in the data, and self-loops (edges between a node and itself).

	To					
From	N	1	2	3	4	5
	1	∞	200	100	500	∞
	2	∞	∞	150	300	∞
	3	∞	∞	∞	∞	∞
	4	∞	∞	∞	∞	100
	5	∞	∞	∞	∞	∞

Note: only the innermost 5x5 matrix is the adjacency matrix.

3. If you are told that these inputs refer to a weighted undirected graph, how would your adjacency matrix change?

∞ could be replaced with 0, and a connection could be replaced with 1, the size of each number in the matrix could be reduced to a single bit, significantly decreasing the size of the board.

Further, if space was a very significant concern, the board could be halved to only include for each node *n* the status of neighbours from *n* to N, where N is the number of nodes in the graph.

4. Which representation, adjacency matrix or adjacency list, would be most suitable for this graph?

Adjacency List, as well over half pairs in the graph do not connect. We cannot really approach the problem from a definitive formal sparse/dense viewpoint since we aren't aware how the problem grows, however, on average each node only has 1 or 2 adjacent nodes, so adjacency list is likely a good guess.