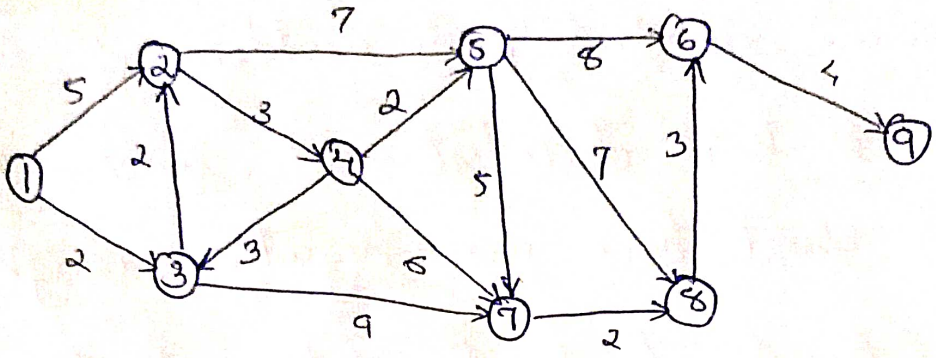
Arun Thomas.
S4 CSE - B
Roll No: 23.

ASSIGNMENT - 2

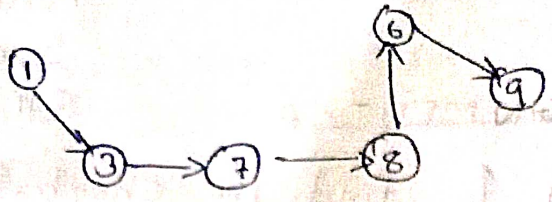
5a. Use Dijkstra's algorithm to find the shortest path between vertex "1" and vertex "9".



1	2	3	4	5	6	7	8	9
0	5	[12]	∞	∞	∞	∞	∞	∞
	[4]		∞	∞	∞	11	∞	∞
				[7]	11	∞	11	∞
					[9]	∞	11	∞
						17	[11]	16
						17		[13]
						[16]		
								[20]

∴ The shortest path length between "1" & "9" = 20

1 — 3 — 7 — 8 — 6 — 9



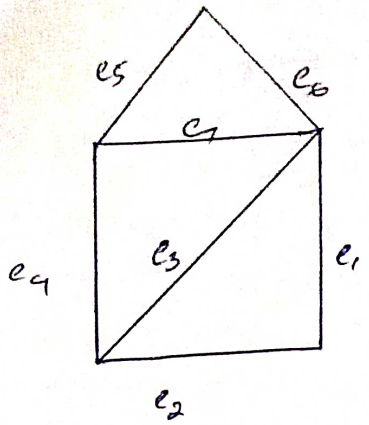
- Dijkstra's shortest path algorithm is a solution to the single-source shortest path problem.
- Works on both directed and undirected graphs. All edges must have non-negative weights.

Approach: Greedy: Finds the path with the minimum cost from one vertex to the other in graph. This algorithm finds such a path by always going to nearest vertex

Input: Weighted graph $G = \{E, V\}$ and source vertex $v \in V$, such that all edges weights are non-negative.

Output: Lengths of shortest path (or shortest path themselves) from a given source vertex $v \in V$ to all other vertices.

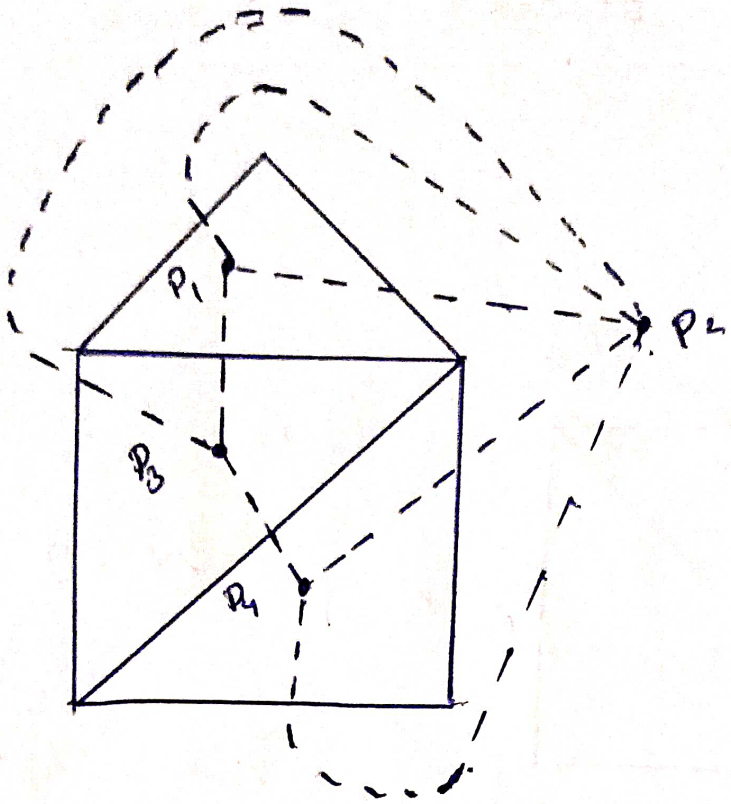
5) Draw the geometric dual for the graph.



The dual of a graph G, is a graph that has a vertex for each face of G. The dual graph has an edge for each pair of faces in G that are seperated from each other by an edge, and a self-loop when the same face appears on both sides of an edge.

Properties of Duals :-

- A self loop in G yields a pendent edge in G'.
- A pendent edge in a G yields a self loop in G'.
- Edges in series in G becomes parallel edges in G'.
- Parallel edges in G becomes edges in series in G'.
- Degree of vertex v_i in G becomes the number of edges forming boundary of face F_i in G'.


P1
P2
P3
P4