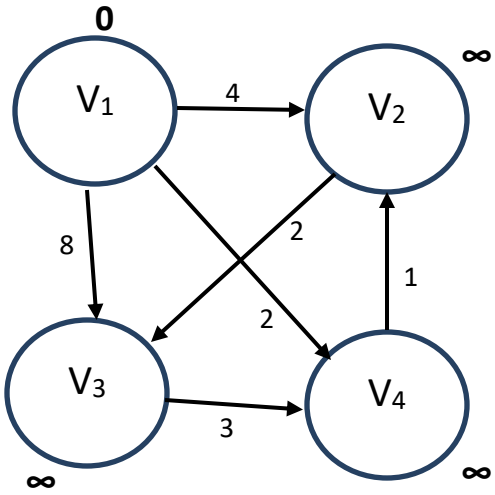
Dijkstra's Shortest Path Example

Example 1: Vertex v_1

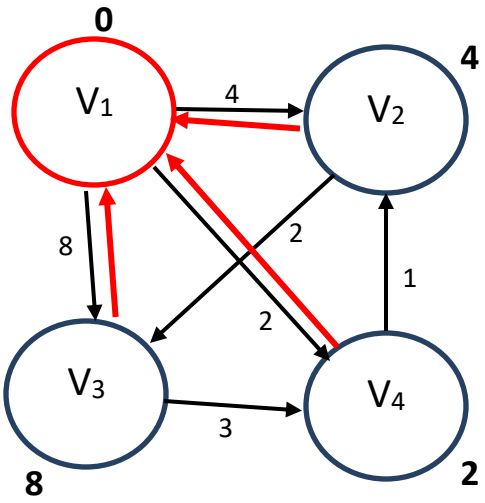


Cost of v_1 is 0.

$S \leftarrow v_1$

There is a path to all neighbors. Each will be updated.

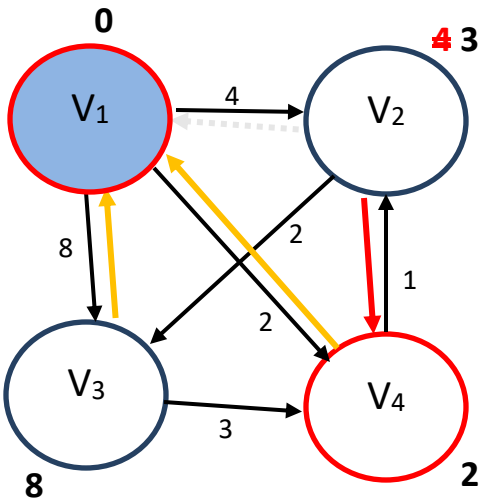
V_1 is marked.



Pick vertex not in S with lowest cost (v_4) and update neighbors.

Only path is to v_2.

Min (4,2+1) = 3 – Change v_2 cost

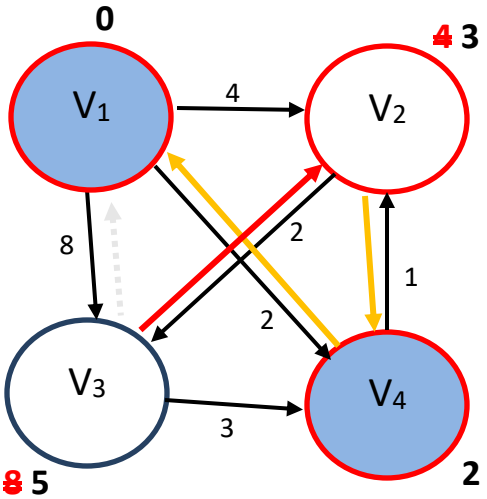


Again, pick vertex not in S with lowest cost (v_2) and update neighbors.

Only path is to v_3.

Min (8,3+2) = 5 – Change v_3 cost

Path v_0 to v_3: (v_1, v_4, v_2, v_3)



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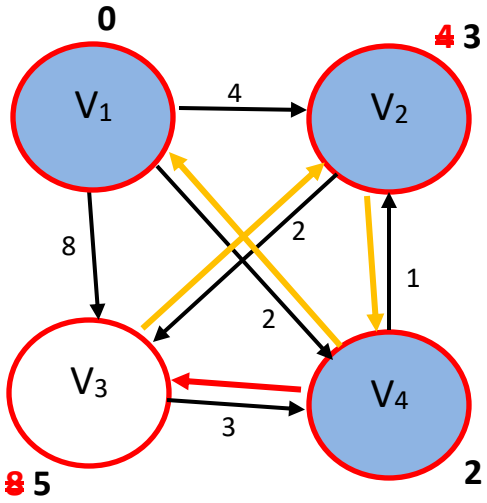
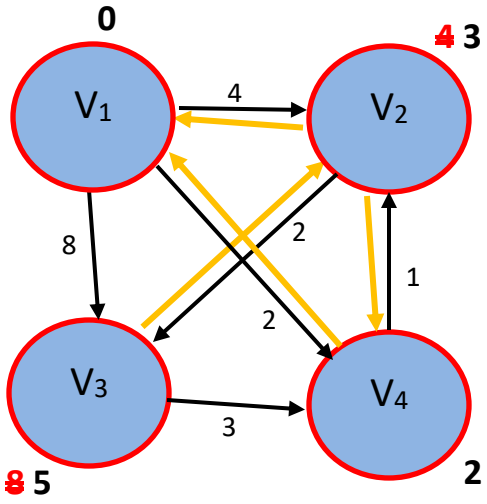
Again, pick vertex not in S with lowest cost and update neighbors. v_3 is only choice

V_3 has a path only to v_4. Cost to v4 from v_0 is Min(2,5+3). Do not update v4 cost.



Final graph, with costs



Exercises: Repeat for vertices v_2, v_3, and v_4.

1. Note that v_1 is not accessible from other vertices.
2. Find the transitive closure of this graph.