

Steps for finding the shortest distance to all vertices from the source using Bellman-Ford algorithm.

1) This step initialises distances from the source to all vertices as infinite and distance to the source itself as 0. Create an array  $dist[]$  of size  $|V|$  with all values as infinite except  $dist[src]$  where  $src$  is source vertex.

2) This step calculates shortest distances. Do the following for  $|V|-1$  times where  $|V|$  is the number of vertices in given graph. Do this for each edge  $(u, v)$ .

\* If  $dist(v) > dist(u) + \text{weight of edge}(u, v)$  then update  $dist(v)$  to  
$$dist(v) = dist(u) + \text{weight of edge}(u, v)$$

3) This step reports if there is a negative weight cycle in the graph.

If we iterate through all edges one more time i.e. after  $(|V|-1)$  iterations and get a shortest path for any vertex, then it indicates there is a negative cycle.

	0	1	2	3	4	5	6	7	8	9
[70]		12	30	10	8	15	20	11	5	2
[12 70]			30	10	8	15	20	11	5	2
[12 30 70]				10	8	15	20	11	5	2
[12 12 30 70]					8	15	20	11	5	2
[8 10 12 30 70]						15	20	11	5	2
[8 10 12 15 30 70]							20	11	5	2
[8 10 12 15 20 30 70]								11	5	2
[8 10 11 12 15 20 30 70]									5	2
[5 8 10 11 12 15 20 30 70]										2
[2 5 8 10 11 12 15 20 30 70]										