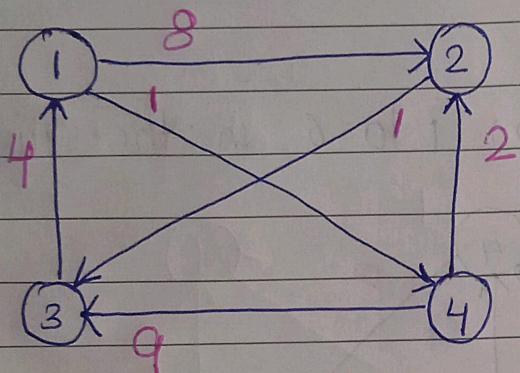


All pairs shortest Paths (Floyd-Warshall)

Floyd-Warshall algorithm is a graph analysis algorithm for finding shortest paths in weighted, directed graph.

$$D^k[i, j] = \min \{ D^{k-1}[i, j], D^{k-1}[i, k] + D^{k-1}[k, j] \}$$

Q. Find the shortest path for the given graph



Find the distance vector for the given graph.

$$D^0 = \begin{bmatrix} & 1 & 2 & 3 & 4 \\ 1 & 0 & 8 & \infty & 1 \\ 2 & \infty & 0 & 1 & \infty \\ 3 & 4 & \infty & 0 & \infty \\ 4 & \infty & 2 & 9 & 0 \end{bmatrix}$$

Including node 1

$$D' = \begin{bmatrix} & 1 & 2 & 3 & 4 \\ 1 & 0 & 8 & \infty & 1 \\ 2 & \infty & 0 & 1 & \infty \\ 3 & 4 & 12 & 0 & 5 \\ 4 & \infty & 2 & 9 & 0 \end{bmatrix}$$

Date / /

Including node 2

$$D^2 = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \left[\begin{matrix} 0 & 8 & 9 & 1 \\ \infty & 0 & 1 & \infty \\ 4 & 12 & 0 & 5 \\ \infty & 1 & 3 & 0 \end{matrix} \right] \end{matrix}$$

Including node 3

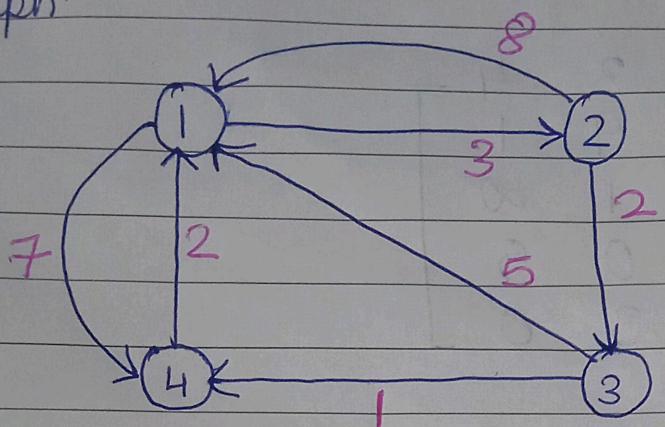
$$D^3 = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \left[\begin{matrix} 0 & 8 & 9 & 1 \\ 5 & 0 & 1 & 6 \\ 4 & 12 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{matrix} \right] \end{matrix}$$

Including node 4

$$D^4 = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \left[\begin{matrix} 0 & 3 & 4 & 1 \\ 5 & 0 & 1 & 6 \\ 4 & 7 & 0 & 5 \\ 7 & 2 & 3 & 0 \end{matrix} \right] \end{matrix}$$

Date ___ / ___ / ___

Q. Solve the all pairs shortest path for the given graph.



Q. Apply Floyd-Warshall algorithm for constructing shortest path.

