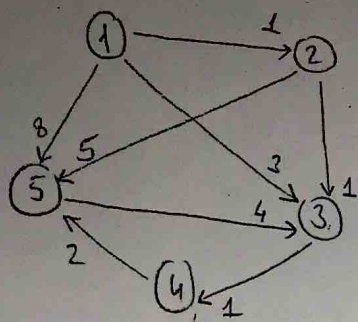


Example 2



D_i = cost matrices

P_0 = previous matrices

$$D_0 = \begin{pmatrix} 0 & 1 & 3 & 8 & 5 \\ 8 & 0 & 1 & 3 & 8 \\ 8 & 8 & 0 & 4 & 2 \\ 8 & 8 & 8 & 0 & 2 \\ 8 & 8 & 4 & 8 & 0 \end{pmatrix}$$

$$P_0 = \begin{pmatrix} 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 2 & 0 & 2 \\ 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \end{pmatrix}$$

$K=1$ using vertex 1 as an intermediate vertex

$$D_1 = \begin{pmatrix} 0 & 1 & 3 & 8 & 8 \\ 8 & 0 & 1 & 3 & 5 \\ 8 & 8 & 0 & 4 & 2 \\ 8 & 8 & 8 & 0 & 2 \\ 8 & 8 & 4 & 8 & 0 \end{pmatrix}$$

$$P_1 = \begin{pmatrix} 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 2 & 0 & 2 \\ 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \end{pmatrix}$$

$K=2$ using vertex 2 as an intermediate vertex

$$D_2 = \begin{pmatrix} 0 & 1 & \boxed{2} & 8 & 8 \\ 8 & 0 & 1 & 3 & 5 \\ 8 & 8 & 0 & 4 & 2 \\ 8 & 8 & 8 & 0 & 2 \\ 8 & 8 & 4 & 8 & 0 \end{pmatrix}$$

$$P_2 = \begin{pmatrix} 0 & 1 & \boxed{2} & 0 & 0 \\ 0 & 0 & 2 & 0 & 2 \\ 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 4 \\ 0 & 0 & 5 & 0 & 0 \end{pmatrix}$$

$K=3$ using vertex 3 as an intermediate vertex

$$D_3 = \begin{pmatrix} 0 & 1 & 2 & \boxed{3} & 8 \\ 8 & 0 & 1 & \boxed{2} & 5 \\ 8 & 8 & 0 & 1 & 3 \\ 8 & 8 & 8 & 0 & 2 \\ 8 & 8 & 4 & \boxed{5} & 0 \end{pmatrix}$$

$$P_3 = \begin{pmatrix} 0 & 1 & 2 & \boxed{3} & 0 \\ 0 & 0 & 2 & \boxed{3} & 2 \\ 0 & 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 4 \\ 0 & 0 & 5 & \boxed{3} & 0 \end{pmatrix}$$

$K=4$ using vertex 4 as an intermediate vertex

$$D_4 = \begin{pmatrix} 0 & 1 & 2 & 3 & \boxed{5} \\ 8 & 0 & 1 & 2 & \boxed{4} \\ 8 & 8 & 0 & 2 & \boxed{3} \\ 8 & 8 & 8 & 0 & 2 \\ 8 & 8 & 4 & 5 & 0 \end{pmatrix}$$

$$P_4 = \begin{pmatrix} 0 & 1 & 2 & 3 & \boxed{4} \\ 0 & 0 & 2 & 3 & \boxed{4} \\ 0 & 0 & 0 & 3 & \boxed{4} \\ 0 & 0 & 6 & 0 & 4 \\ 0 & 0 & 5 & 3 & 0 \end{pmatrix}$$

$K=5 \Rightarrow$ using 5 as an intermediate vertex

$$D_5 = \begin{pmatrix} 0 & 1 & 2 & 3 & 5 \\ \infty & 0 & 1 & 2 & 4 \\ \infty & \infty & 0 & 1 & 3 \\ \infty & \infty & \boxed{6} & 0 & 2 \\ \infty & \infty & 4 & 5 & 0 \end{pmatrix}$$

$$P_5 = \begin{pmatrix} 0 & 1 & 2 & 3 & 5 \\ 0 & 0 & 2 & 3 & 5 \\ 0 & 0 & 0 & 3 & 5 \\ 0 & 0 & \boxed{5} & 0 & 5 \\ 0 & 0 & 5 & 3 & 0 \end{pmatrix}$$

ex) $D_5(5,2) = \infty \Rightarrow$ there is no path from 5 to 1

ex) The minimum walk from 4 to 3 has the cost 6

$$P_5(4,3) = 5$$

$$P_5(4,5) = 4$$

$\xrightarrow{\text{source}}$

$$4 \xrightarrow{2} 5 \xrightarrow{4} 3$$

ex) The minimum walk from 1 to 5 has cost 5

$$P_5(1,5) = 4$$

$$P_5(1,4) = 3$$

$$P_5(1,3) = 2$$

$$P_5(1,2) = \frac{1}{\text{source}}$$

$$1 \xrightarrow{1} 2 \xrightarrow{1} 3 \xrightarrow{1} 4 \xrightarrow{2} 5$$