Branch lengths are shown on the figure.

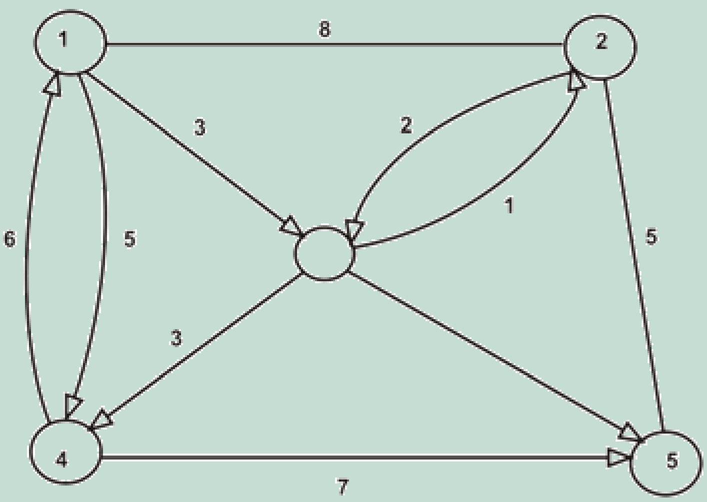

Figure Z1. Transportation network for studying Floyd's algorithm.

Starting matrix D_o is as follows:

$$D_o = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 0 & 8 & 3 & 5 & \infty \\ 8 & 0 & 2 & \infty & 5 \\ \infty & 1 & 0 & 3 & 4 \\ 6 & \infty & \infty & 0 & 7 \\ \infty & 5 & \infty & \infty & 0 \end{bmatrix} \end{array} \qquad Q_o = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} - & 1 & 1 & 1 & 1 \\ 2 & - & 2 & 2 & 2 \\ 3 & 3 & - & 3 & 3 \\ 4 & 4 & 4 & - & 4 \\ 5 & 5 & 5 & 5 & - \end{bmatrix} \end{array}$$

First we note that node i is the immediate predecessor of node j on the shortest path leading from node i to node j (for $i \neq j$) . For this reason we have, for example:

$$q^{o}_{2,1} = q^{o}_{2,3} = q^{o}_{2,4} = q^{o}_{2,5} = 2$$

We now go to the first algorithmic step. Let $k = 1$. As an illustration of Step 2 we calculate the elements of the first three rows of matrix D_1. Calculations for other rows are left as an exercise.

Matrix D_1 is as follows:

$$D_1 = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 0 & 8 & 3 & 5 & \infty \\ 8 & 0 & 2 & \textcircled{13} & 5 \\ \infty & 1 & 0 & 3 & 4 \\ 6 & \textcircled{14} & \textcircled{9} & 0 & 7 \\ \infty & 5 & \infty & \infty & 0 \end{bmatrix} \end{array} \qquad Q_1 = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} - & 1 & 1 & 1 & 1 \\ 2 & - & 2 & 1 & 2 \\ 3 & 3 & - & 3 & 3 \\ 4 & 1 & 1 & - & 4 \\ 5 & 5 & 5 & 5 & - \end{bmatrix} \end{array}$$

After the second, third, fourth and fifth passages through the algorithm, matrices D_2, Q_2, D_3, Q_3, D_4, Q_4 and D_5, Q_5 are as follows:

$$
D_2 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0 & 8 & 3 & 5 & 13 \\ 2 & 8 & 0 & 2 & 13 & 5 \\ 3 & 9 & 1 & 0 & 3 & 4 \\ 4 & 6 & 14 & 9 & 0 & 7 \\ 5 & 13 & 5 & 7 & 18 & 0 \end{array} \qquad Q_2 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & - & 1 & 1 & 1 & 2 \\ 2 & 2 & - & 2 & 1 & 2 \\ 3 & 2 & 3 & - & 3 & 3 \\ 4 & 4 & 1 & 1 & - & 4 \\ 5 & 2 & 5 & 2 & 1 & - \end{array}
$$

$$
D_3 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0 & 4 & 3 & 5 & 7 \\ 2 & 8 & 0 & 2 & 5 & 5 \\ 3 & 9 & 1 & 0 & 3 & 4 \\ 4 & 6 & 10 & 9 & 0 & 7 \\ 5 & 13 & 5 & 7 & 10 & 0 \end{array} \qquad Q_3 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & - & 3 & 1 & 1 & 3 \\ 2 & 2 & - & 2 & 3 & 2 \\ 3 & 2 & 3 & - & 3 & 3 \\ 4 & 4 & 3 & 1 & - & 4 \\ 5 & 2 & 5 & 2 & 3 & - \end{array}
$$

$$
D_4 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0 & 4 & 3 & 5 & 7 \\ 2 & 8 & 0 & 2 & 5 & 5 \\ 3 & 9 & 1 & 0 & 3 & 4 \\ 4 & 6 & 10 & 9 & 0 & 7 \\ 5 & 13 & 5 & 7 & 10 & 0 \end{array} \qquad Q_4 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & - & 3 & 1 & 1 & 3 \\ 2 & 2 & - & 2 & 3 & 2 \\ 3 & 2 & 3 & - & 3 & 3 \\ 4 & 4 & 3 & 1 & - & 4 \\ 5 & 2 & 5 & 2 & 3 & - \end{array}
$$

$$
D_5 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & 0 & 4 & 3 & 5 & 7 \\ 2 & 8 & 0 & 2 & 5 & 5 \\ 3 & 9 & 1 & 0 & 3 & 4 \\ 4 & 6 & 10 & 9 & 0 & 7 \\ 5 & 13 & 5 & 7 & 10 & 0 \end{array} \qquad Q_5 = \begin{array}{c|ccccc|} & 1 & 2 & 3 & 4 & 5 \\ 1 & - & 3 & 1 & 1 & 3 \\ 2 & 2 & - & 2 & 3 & 2 \\ 3 & 2 & 3 & - & 3 & 3 \\ 4 & 4 & 3 & 1 & - & 4 \\ 5 & 2 & 5 & 2 & 3 & - \end{array}
$$