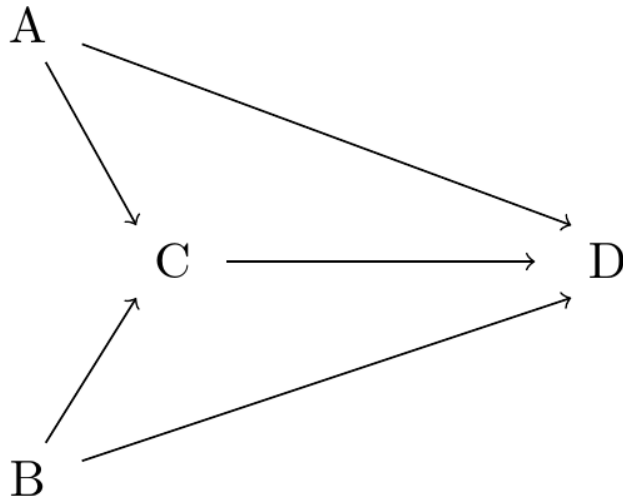


Homework 5: Network Assignment and Validation

Hayden Atchley

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Given a network of



and link travel time equations of

$$\begin{aligned}t_{AD} &= 20 + 0.01q_{AD} \\t_{AC} &= 10 + 0.005q_{AC} \\t_{CD} &= 12 + 0.005q_{CD} \\t_{BC} &= 7.25 + 0.005q_{BC} \\t_{BD} &= 20 + 0.01q_{BD},\end{aligned}$$

with 7000 trips from A to D and 500 from B to D:

5.1

We set up a matrix to solve the system of equations:

$$\begin{pmatrix}
q_{AD} & q_{AC} & q_{CD} & q_{BC} & q_{BD} & t_{AD} & t_{AC} & t_{CD} & t_{BC} & t_{BD} & = \\
0.01 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & -20 \\
0 & 0.005 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & -10 \\
0 & 0 & 0.005 & 0 & 0 & 0 & 0 & -1 & 0 & 0 & -12 \\
0 & 0 & 0 & 0.005 & 0 & 0 & 0 & 0 & -1 & 0 & -7.25 \\
0 & 0 & 0 & 0 & 0.01 & 0 & 0 & 0 & 0 & -1 & -20 \\
0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & -1 & 0 \\
1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 7000 \\
0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 5000 \\
0 & 1 & -1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0
\end{pmatrix}$$