Reading directed/weighted networks

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. A→B takes 5 min, B→C takes 4 min, A→C takes 12 min. Find the A→B→C journey time. [2 marks]

Both arrows exist.

$5 + 4 = 9$.

Answer: 9 min.

2. The only edges are A→B, B→C and A→C. Is C→B→A permitted? [2 marks]

C→B is absent.

B→A is also absent.

Answer: No.

3. P→Q has capacity 8 vehicles/min. Interpret this label. [2 marks]

This is a capacity.

It does not state the travel time.

Answer: At most 8 vehicles per minute can use the directed connection P→Q.

4. An undirected edge X-Y weighs 7 km. Find the length X→Y→X when repetition is permitted. [2 marks]

An undirected edge can be traversed both ways.

$7 + 7 = 14$.

Answer: 14 km.

5. A→B costs 4 dollars while B→A costs 6 dollars. Explain why one undirected weight is unsuitable. [2 marks]

The model needs two directed edges.

One undirected value would lose information.

Answer: The cost depends on direction.

6. Why must a missing connection not be recorded as a zero-weight available edge? [2 marks]

Absent and available at zero cost are different.

It could produce an invalid optimum.

Answer: That would falsely create a free direct connection.