Using networks to explain practical relationships

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Libraries are vertices and direct delivery services are edges. Interpret an isolated vertex. [2 marks]

Apply the stated vertex/edge rule.

Answer: A library without a direct service in the model.

2. Components are {A,B,C} and {D,E,F}. Suggest a link connecting them. [2 marks]

Choose endpoints in different components.

Answer: For example CD.

3. A route has lengths 3.2,1.5,2.8 km. Find its total. [2 marks]

$3.2 + 1.5 + 2.8 = 7.5.$

Answer: 7.5 km.

4. A chain AB,BC,CD gains edge AD. Explain a reliability benefit. [3 marks]

The cycle gives an alternative route around a failed edge.

Answer: All vertices remain connected after any one of the four edges fails.

5. Why can a three-link route be shorter than a two-link route? [2 marks]

Link count and total distance are different quantities.

Answer: Its edge weights can have a smaller total.

6. A road model assumes every road is two-way and open. Give two limitations for emergencies. [3 marks]

Explain how each omitted condition affects actual reachability.

Answer: One-way restrictions and road closures may invalidate routes.