Networks - Practice test 2

16 questions | 40 marks | 55 minutes

Translate and compare tables and diagrams.

Equivalent correct methods earn the corresponding marks.

1. What does a 1 mean in a simple connection table? [2 marks]

Use the table convention.

Answer: A direct link between the row and column vertices.

2. List each edge in this table once. [3 marks]

From / to	A	B	C	D
A	0	1	0	1
B	1	0	1	0
C	0	1	0	1
D	1	0	1	0

Read only one half of the symmetric table.

Answer: AB, AD, BC, CD.

3. Draw the network W-X-Y-Z with no extra links. [3 marks]



Mark four vertices and exactly three edges.

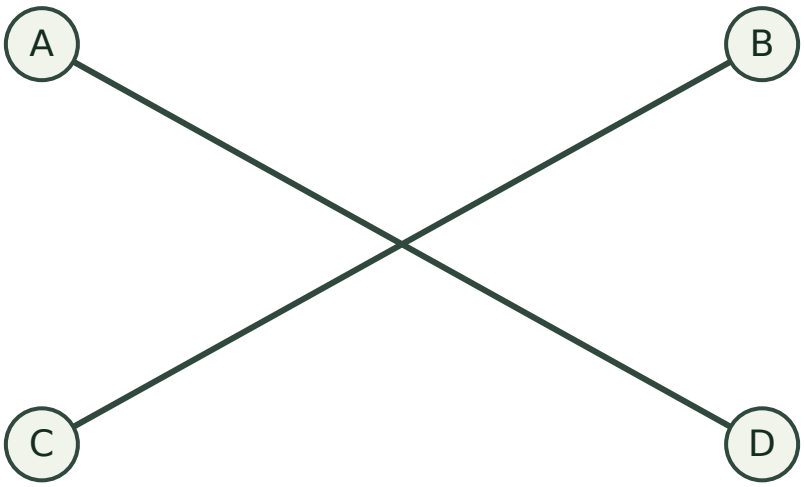
Answer: A four-vertex chain with WX, XY, YZ.

4. Five computers A-E have cables AB, BC and CD only. Which computer is isolated? [2 marks]

E does not occur as an endpoint.

Answer: E.

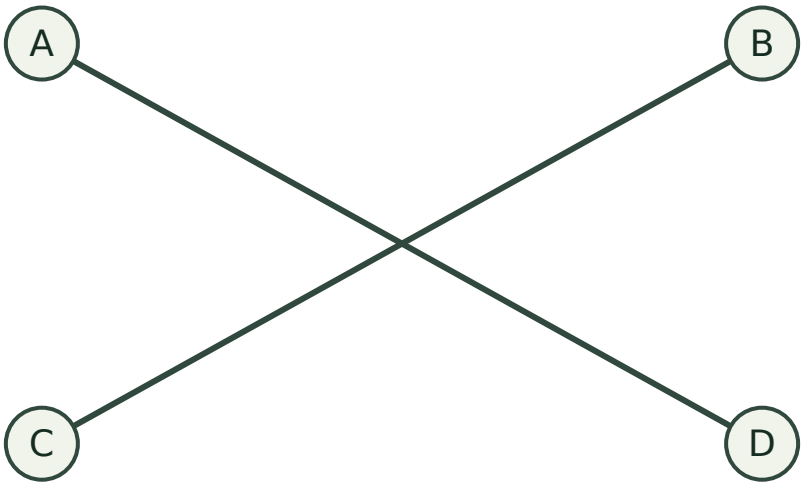
5. How many components are in the crossing-edge diagram? [2 marks]



The crossing is not a junction.

Answer: 2: {A,D} and {B,C}.

6. Can a traveller turn from AD onto BC at the unmarked crossing? Explain. [2 marks]



No vertex permits switching edges.

Answer: No.

7. Why must an undirected connection table be symmetric? [2 marks]

AB contributes to both the A,B and B,A entries.

Answer: Every connection is mutual.

8. A symmetric zero-diagonal table has eighteen 1s. How many edges? [2 marks]

Each edge has two entries; $18 \div 2 = 9$.

Answer: 9.

9. Two labelled networks have every vertex of degree 2. Is that enough to establish identical networks? [3 marks]

Their named vertices can have different neighbours.

Compare their actual edge sets.

Answer: No.

10. P has AB,BC,CD,DA. Q has BA,DC,CB,AD. Are they identical undirected labelled networks? [2 marks]

Reversing an undirected edge name changes nothing.

The edge sets match.

Answer: Yes.

11. For edges AB, AC, AD find the descending degree sequence. [2 marks]

A meets three edges; each other vertex meets one.

Answer: 3,1,1,1.

12. A route is A-B-C-D-E. How many edges are used? [2 marks]

There is one edge between each consecutive pair.

Answer: 4.

13. Components are {P,Q,R}, {S,T}, {U}. Find the minimum extra edges for connectedness. [3 marks]

Each link can merge at most two components.

Answer: 2.

14. Components are {P,Q,R}, {S,T} and {U}. Give two new links that connect all components. [3 marks]

RS joins the first two groups.

TU connects the isolated vertex to them.

Answer: For example RS and TU.

15. A transport map is redrawn with curved edges. What must remain unchanged for it to represent the same network? [3 marks]

Page position is not a relationship.

All specified connections must be retained.

Answer: The vertex set and endpoints of all edges, including any relevant directions and weights.

16. Services AB and BC exist, but departure times prevent a same-day connection. Explain why the network route may be misleading. [4 marks]

Reachability in a static service graph does not guarantee a feasible timetable.

Include service times to answer that question.

Answer: The simple model omits timing.