Networks - Applications test

16 questions | 42 marks | 55 minutes

Justify practical access and reliability decisions.

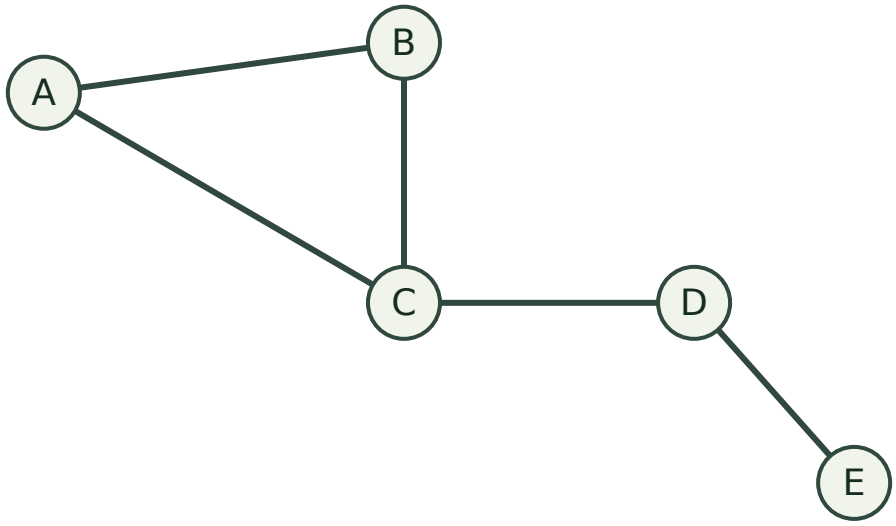
Equivalent correct methods earn the corresponding marks.

1. In a campus model, buildings are joined when a covered path directly connects them. Define vertices and edges. [2 marks]

Use the stated relationship.

Answer: Vertices are buildings; edges are direct covered paths.

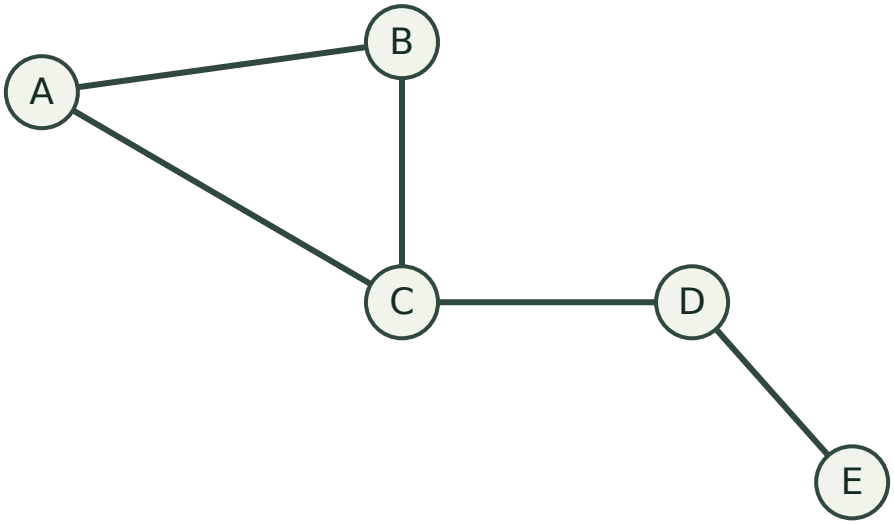
2. Edges are AB, BC, CA, CD, DE. Find degree(C). [2 marks]



CA, CB and CD meet C.

Answer: 3.

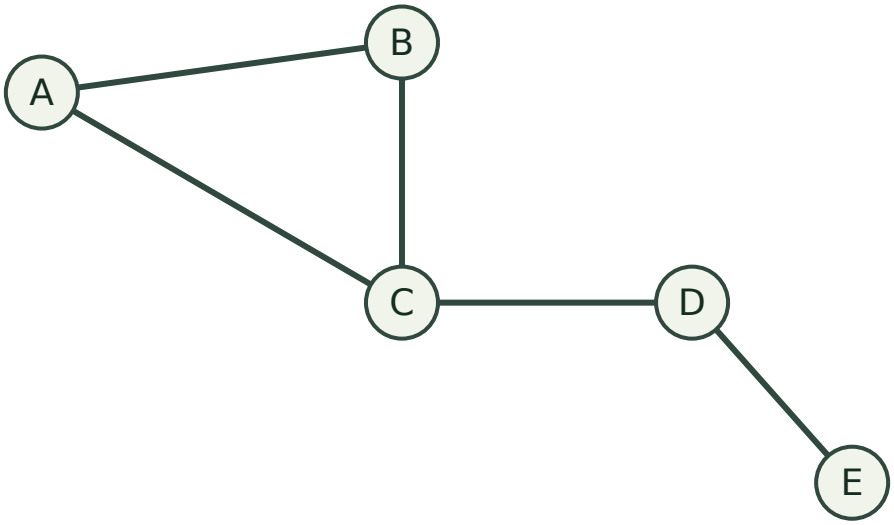
3. Count the vertices and edges in the displayed campus network. [2 marks]



Labels A-E give five vertices and the list has five links.

Answer: 5 vertices, 5 edges.

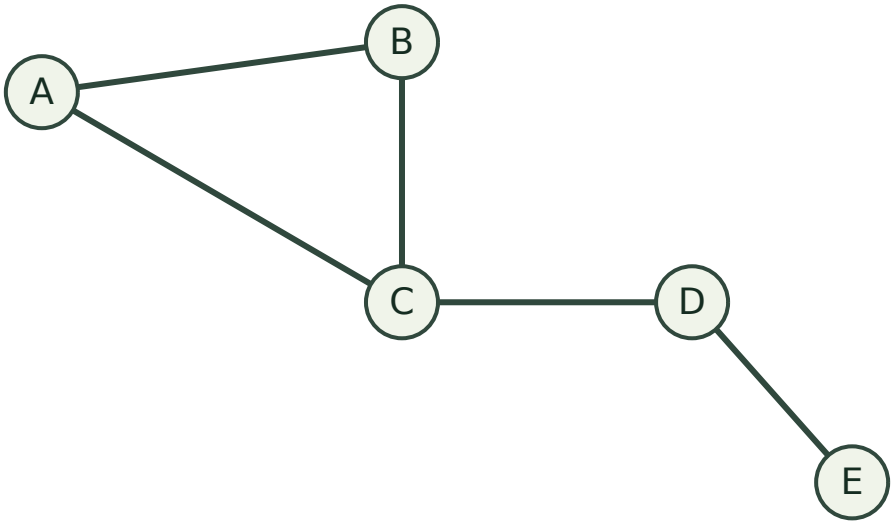
4. Give a route from B to E in the displayed network. [2 marks]



BC, CD and DE exist.

Answer: B-C-D-E.

5. Which edges in the displayed network are bridges? [3 marks]

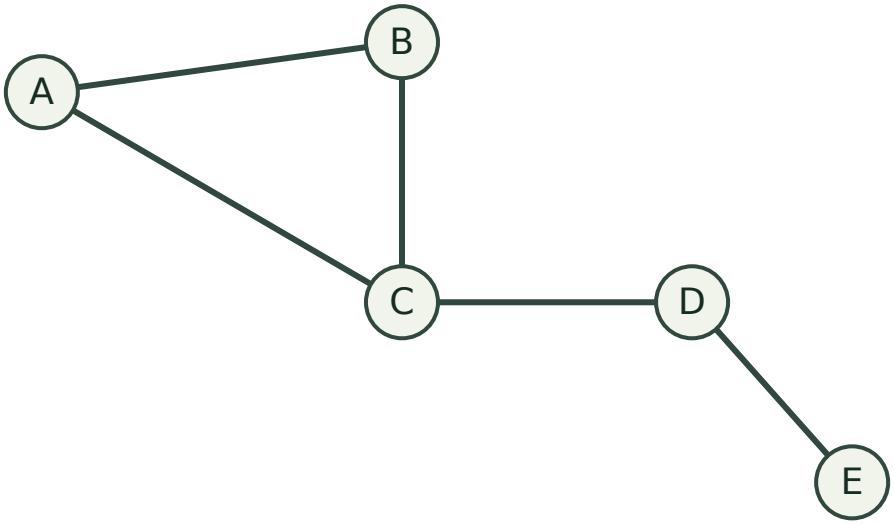


Triangle edges have alternative routes.

These two links are sole connections to later sites.

Answer: CD and DE.

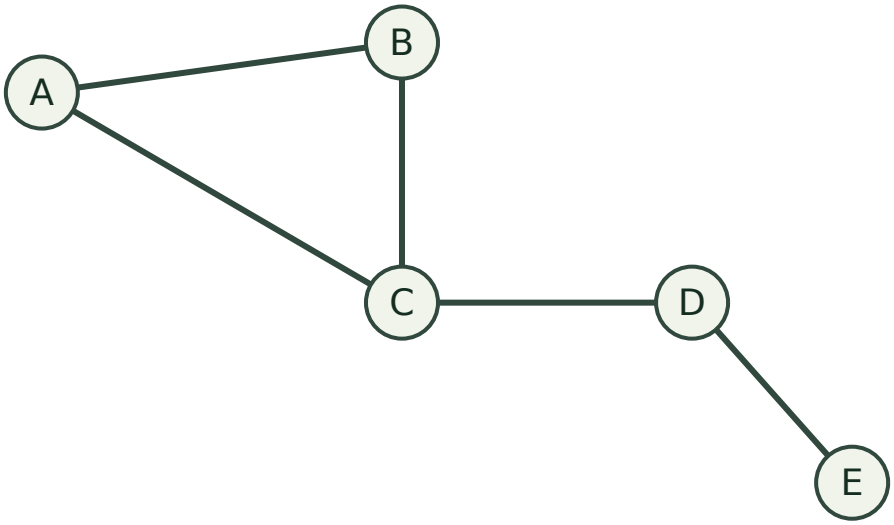
6. If CD closes in the displayed network, name the components. [2 marks]



The triangle is separated from D and E.

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

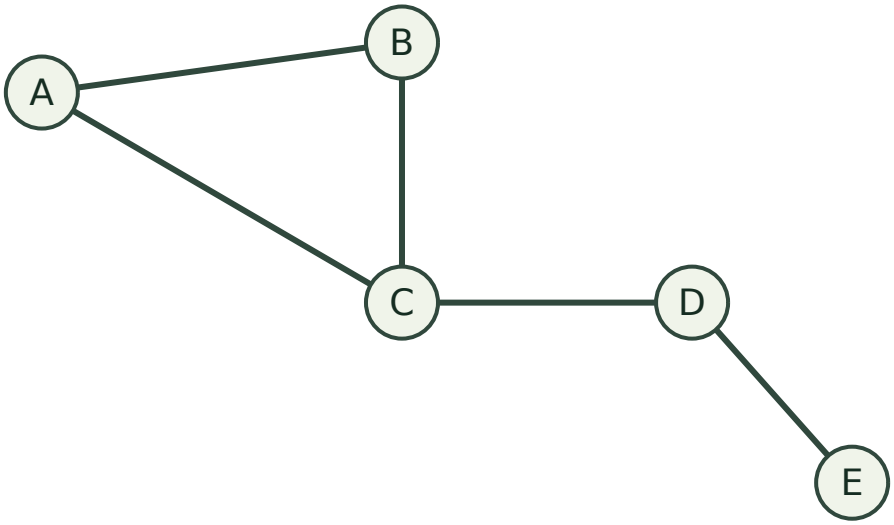
7. Add edge BE to the displayed network. Give a route from A to D avoiding C. [3 marks]



AB, BE and ED exist.

Answer: A-B-E-D.

8. Add BE to the displayed network. Explain why all vertices remain reachable after any one edge closes. [4 marks]



AB, BC and CA lie on the triangle.

BC, CD, DE and EB lie on another cycle.

An alternative route exists around each failed edge.

Answer: Each edge lies on a cycle.

9. A-B-E takes 6 and 11 minutes. A-C-D-E takes 4,5,3 minutes. Compare totals. [3 marks]

Add each route’s edge times.

Answer: 17 minutes and 12 minutes; the second is 5 minutes quicker.

10. Why can the route with more links be quicker? [2 marks]

Link count and total time are different measures.

Answer: Its link times have a smaller total.

11. A connected five-building network gains isolated vertices F and G. How many components? [2 marks]

The existing group is one component; F and G each form another.

Answer: 3.

12. A network has one connected group of five buildings and two isolated buildings F and G. What is the minimum number of new paths needed to connect them all? [3 marks]

Join F to the main group and G to F or that group.

Answer: 2.

13. A planner omits a warehouse because it has no path. Why is the model incomplete? [2 marks]

Add the warehouse as a degree-zero vertex.

Answer: Every building must appear, including isolated ones.

14. A draft undirected network has degree sum 17. Why does it need checking? [3 marks]

Every edge contributes 2.

At least one entry or count is wrong.

Answer: The sum must be even.

15. A direct-road network is connected. Does this prove wheelchair-accessible travel between every site? [3 marks]

Accessibility information is missing.

A connected route may contain an inaccessible link.

Answer: No.

16. Suggest two extra edge attributes useful for an emergency campus plan and explain their uses. [4 marks]

Times compare duration.

Closure risk helps assess reliability.

Other justified relevant attributes are acceptable.

Answer: For example travel time and closure risk.