Minimum connectors and maximum flow

Learn and practise | Free preview

A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Trees and minimum connector problems

• Flow problems

Useful starting skills: Relevant General Mathematics Units 1–2 arithmetic, algebra, statistics, matrices and networks.

A minimum spanning tree connects every vertex with least total edge weight and no cycle. Prim’s algorithm repeatedly connects a new vertex by the cheapest available edge.

A flow network has capacities, directions, source and sink. Flow conservation holds at intermediate vertices; a cut capacity provides an upper bound on source-to-sink flow.

Worked example

Edges AB=1, AC=4, BC=2, BD=5, CD=3. Find an MST.

Select 1, 2, 3 without a cycle

every vertex is connected.

Answer: AB, BC, CD, total 6.

Try it yourself

Name: _____ Date: _____

1. How many edges does a spanning tree on 7 vertices have?

2. For triangle edges AB=2, BC=3, AC=9, find MST weight.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 6.

A tree has one fewer edge than vertices.

2. 5.

Select AB and BC; AC would add a cycle.

Curriculum reference: General Mathematics Units 3–4 — Trees and minimum connector problems; General Mathematics Units 3–4 — Flow problems

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