



QUESTION WORKBOOK

Flows in networks: cuts and capacity

Decision Mathematics 2 · Year FM

6 questions · 20 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** A cut crosses arcs of capacity 9 and 6 towards the sink and an arc of capacity 5 back towards the source. Find its capacity and explain the treatment of the third arc. [2]

- A2** Explain why the capacity of any cut is an upper bound for the flow through the network. [2]

SECTION B · Standard

- B1** A network has SA 12, SB 9, AC 7, AD 6, BD 8, CT 10, DT 11, all arcs directed away from S and towards T. Find the capacity of the cut round the source, the cut round the sink, and the cut separating $\{S, A, B, D\}$ from $\{C, T\}$. [5]

- B2** For the same network, find the capacity of the cut separating $\{S, B\}$ from $\{A, C, D, T\}$, and say what it adds to what you already know. [3]

- B3** A different network has two factories and three shops. Describe how to bring it into the standard one-source, one-sink form. [3]

SECTION C · Stretch

- C1** In the network above, vertex D can handle at most 8 units in total. Explain how to model this and find the new capacity of the cut separating $\{S, A, B, D\}$ from $\{C, T\}$. [5]