



QUESTION WORKBOOK

Dynamic programming

Decision Mathematics 2 · Year FM

6 questions · 21 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 State Bellman's principle of optimality and say what it allows you to do. [2]

A2 From a vertex there are two options: a step of 6 to a vertex worth 11, and a step of 10 to one worth 5. Give the value of the vertex for a minimum-total problem and for a minimax problem. [2]

SECTION B · Standard

B1 A network runs S to $\{A, B\}$ to $\{C, D\}$ to T with SA 5, SB 3, AC 4, AD 9, BC 8, BD 2, CT 6, DT 7. Find the shortest route from S to T by dynamic programming, setting your work out as a table. [6]

- B2** In that solution the step from S to B costs 3 while S to A costs 5, and B also won. Explain why this does not show that taking the cheapest first step is a sound method. [3]

- B3** Explain the difference between the stage variable and the state variable, using the network above. [3]

SECTION C · Stretch

- C1** For the same network, find the route whose smallest single stage is as large as possible, and state that largest value. [5]