InkMaths

QUESTION WORKBOOK

Shortest paths: Dijkstra and Floyd

Decision Mathematics 1 · Year FM

7 questions · 34 marks

PRINT EDITION

inkphysics.co.uk/maths

SECTION A · Warm-up

A1 Describe what the three parts of a Dijkstra label record. [3]

A2 A Dijkstra run gives final labels A 0, B 5, C 7, D 9, E 13, F 15. Given that AC has weight 7, CE weight 6 and EF weight 2, find the shortest route from A to F. [3]

SECTION B · Standard

B1 A network has edges AB 5, AC 7, AD 9, BC 3, BE 9, CD 3, CE 6, DE 5, DF 10 and EF 2. Use Dijkstra's algorithm to find the shortest route from A to F, showing the order in which the vertices become permanent and every working value. [8]

B2 For the same network, explain why the route A, D, F is not shortest, and state what Dijkstra did when it examined D. [4]

B3 In a Floyd distance matrix the entry from A to E is currently unreachable, A to C is 7 and C to E is 6. State what the C iteration does to both matrices. [4]

B4 Explain why Dijkstra's algorithm makes permanent the smallest temporary label anywhere, rather than the cheapest edge from the vertex it has just finished with. [3]

SECTION C · Stretch

C1 A network on A, B, C, D has edges AB 3, AC 8, BC 2, BD 5 and CD 6. Write down the initial distance and route matrices, then carry out the first two iterations of Floyd's algorithm, giving both matrices after each one. [9]