



QUESTION WORKBOOK

Graphs: order, Eulerian paths and planarity

Decision Mathematics 1 · Year FM

7 questions · 24 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 Explain why the number of odd nodes in any graph must be even. [2]

A2 A connected graph has nine edges and node orders 3, 3, 4, 3, 3 and 2. Verify the orders and classify the graph. [3]

SECTION B · Standard

B1 State how many edges the complete graphs K_5 and K_6 have, and explain which of them is Eulerian. [4]

B2 Describe the planarity algorithm and explain what it does when the graph is not planar. [4]

B3 Two graphs both have six nodes, nine edges and the same list of node orders. Explain why that does not prove they are isomorphic. [2]

B4 In a network of paths through a park, exactly two junctions have an odd number of paths meeting at them. State what this means for a warden who must walk every path exactly once, and what changes if an extra path is built between those two junctions. [3]

SECTION C · Stretch

- C1** K_5 is the complete graph on the five nodes A, B, C, D and E. Taking ABCDEA as the Hamiltonian cycle, apply the planarity algorithm to K_5 and hence prove that it is not planar. [6]