



QUESTION WORKBOOK

Decision analysis

Decision Mathematics 2 · Year FM

6 questions · 25 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** State what a square node and a circular node stand for on a decision tree, and where the costs are written. [3]

- A2** A chance node has a 0.4 branch paying 250 and a 0.6 branch paying 60, and reaching it costs 45. Find its expected monetary value. [2]

SECTION B · Standard

- B1** A firm can develop a product in-house for 60, giving a 0.5 chance of revenue 200, 0.3 of 90 and 0.2 of 20; or licence it for 25, giving 0.7 of 110 and 0.3 of 40; or do nothing. All figures are in thousands. Find the expected monetary value of each option and state the decision. [6]

- B2** State the worst outcome of the chosen option, and explain why a small firm might reject it despite its expected monetary value. [3]

- B3** Explain what utility is, and describe how a utility of the square root of the pay-off changes the comparison of a gamble paying 200 or nothing with equal chance against a certain 80. [4]

SECTION C · Stretch

- C1** A firm can develop a product in-house for 60, giving a 0.5 chance of revenue 200, 0.3 of 90 and 0.2 of 20; or licence it for 25, giving 0.7 of 110 and 0.3 of 40; or do nothing. All figures are in thousands, and without further information the best option is in-house, with expected monetary value 71. Before deciding, the firm can commission a survey costing 10. It reports favourably with probability 0.6, after which the in-house revenue probabilities become 0.7, 0.2 and 0.1; otherwise they become 0.2, 0.4 and 0.4. The licence figures are unaffected. Decide whether the survey is worth commissioning. [7]