



QUESTION WORKBOOK

Combinations of normal random variables

Further Statistics 2 · Year FM

6 questions · 24 marks

PRINT EDITION

SECTION A · Warm-up

- A1** State the distribution of $aX + bY$ when X and Y are independent normal variables, and the one condition it needs. [2]

- A2** X is $N(12, 9)$ and Y is $N(7, 16)$, and X and Y are independent. Write down the distributions of $X + Y$ and $X - Y$, and find the distribution of $2X - 3Y$. [4]

SECTION B · Standard

- B1** X is $N(12, 9)$ and Y is $N(7, 16)$, and X and Y are independent. Find $P(X < Y)$. [4]

- B2** X is $N(12, 9)$. Find the distribution of $X_1 + X_2 + X_3 + X_4 + X_5$ for five independent readings, and of $5X$ for a single one. Explain the difference. [4]

- B3** The weights of adults are modelled as $N(70, 100)$ kg, independently. Eight adults get into a lift rated for 600 kg. Find the probability that the rating is exceeded. [4]

SECTION C · Stretch

- C1** The weights of adults are modelled as $N(70, 100)$ kg, independently. A lift is rated for 600 kg. Find the greatest number of adults that can be allowed into the lift if the probability that the rating is exceeded is to be less than 0.01. [6]