



QUESTION WORKBOOK

Continuous random variables: density and distribution functions

Further Statistics 2 · Year FM

6 questions · 22 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

- A1** Explain why $P(X = 1.5) = 0$ for a continuous random variable, and what follows for strict and non-strict inequalities. [2]

- A2** $f(x) = k(4 - x^2)$ for $0 \leq x \leq 2$ and zero elsewhere. Find k . [3]

SECTION B · Standard

- B1** The random variable X has density $f(x) = (3/16)(4 - x^2)$ for $0 \leq x \leq 2$ and zero elsewhere. Find $F(x)$ and hence $P(X < 1)$. [4]

- B2** The random variable X has density $f(x) = x/8$ for $0 \leq x \leq 4$ and zero elsewhere. Find $F(x)$, the median and the lower quartile. [4]

- B3** A variable has $F(x) = x^2/16$ on $0 \leq x \leq 4$. Find its density and $P(1 < X < 3)$. [3]

SECTION C · Stretch

- C1** The random variable X has density $f(x) = x$ for $0 \leq x < 1$ and $f(x) = 2 - x$ for $1 \leq x \leq 2$, and zero elsewhere. Verify that f is a valid density, find $F(x)$ in full, and find the upper quartile of X , giving an exact answer. [6]