



QUESTION WORKBOOK

The Central Limit Theorem

Further Statistics 1 · Year FM

7 questions · 27 marks

PRINT EDITION

SECTION A · Warm-up

- A1** State the Central Limit Theorem, including what it says about the shape of the parent distribution. [3]

- A2** A population has mean 75 and standard deviation 16. Write down the approximate distribution of the mean of a sample of 64, and state the standard error. [3]

SECTION B · Standard

- B1** A population has mean 75 and standard deviation 16, and a random sample of 64 is taken. Find the probability that the sample mean exceeds 78. [4]

- B2** Counts follow $Po(9)$. Find the approximate distribution of the mean of 36 such counts, and the probability that this mean is below 8.5. [4]

- B3** A population has standard deviation 6. Find the smallest sample size for which the standard error of the mean is at most 0.5. [3]

- B4** A student claims that as the sample size grows, the sample values themselves become normally distributed. Explain what is wrong with this, and state what actually becomes normal. [3]

SECTION C · Stretch

- C1** A population has standard deviation 5 and unknown mean μ . A random sample of size n is taken. Find the smallest n for which the sample mean lies within 1 of μ with probability at least 0.95, and state what the Central Limit Theorem contributes to the argument. [7]