

5.3 The Central Limit Theorem

Name: _____ Class: _____ Date: _____ Total: 8 marks

KEY WORDS central limit theorem 中心极限定理 • sampling distribution 抽样分布

Objective

Build the skills to answer exam questions on **the Central Limit Theorem**.

You must be able to:

- state the **Central Limit Theorem** 中心极限定理: for large n , the sampling distribution of $\bar{x}$ is approximately normal
- use the guideline $n \geq 30$
- explain that this holds **regardless** of the population's shape

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ The Central Limit Theorem

For a **large enough** sample (a common guideline is $n \geq 30$), the sampling distribution of the sample mean $\bar{x}$ is approximately **normal** — **whatever** the shape of the original population.

■ Why it matters

It lets us use normal-based methods to make inferences about a population mean, even from skewed populations.

2 Practice

2.1 State what the Central Limit Theorem says about the distribution of $\bar{x}$. [1]

2.2 State the common sample-size guideline for the CLT. [1]

2.3 State whether the CLT depends on the population's shape. [1]

3 Exam-style questions

3.1 By the Central Limit Theorem, the sampling distribution of $\bar{x}$ is approximately [1]

- | | |
|---|---|
| A | B |
| C | D |
- A skewed
B normal for large n
C uniform
D binomial

3.2 A common sample-size guideline for the CLT is [1]

- | | |
|---|---|
| A | B |
| C | D |
- A $n \geq 5$
B $n \geq 30$
C $n \geq 100$
D $n = 1$

3.3 A population is strongly skewed. Samples of size 50 are taken.

(a) State the approximate shape of the sampling distribution of $\bar{x}$. [1]

(b) Name the theorem responsible. [1]

(c) State whether the population itself must be normal. [1]