

6.1 Introducing Statistics: Why Be Normal?

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

KEY WORDS inference 推断 • normal 正态 • large counts condition 大计数条件
• confidence interval 置信区间

Objective

Build the skills to answer exam questions on **why the normal model matters for inference**.

You must be able to:

- explain that the **normal** 正态 approximation underlies inference for proportions
- state the **large counts condition** 大计数条件
- describe what inference estimates from a sample

1 Worked examples

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

■ **Why normal?**

Because the sampling distribution of $\hat{p}$ is approximately **normal** (when conditions are met), we can use z -values to build confidence intervals and run tests about a population proportion.

■ **The large counts condition**

The normal model applies when $np \geq 10$ **and** $n(1 - p) \geq 10$. Inference then uses the sample to estimate the unknown population proportion p .

2 Practice

2.1 State why the normal distribution is central to inference for proportions. [1]

2.2 State the large counts condition for a proportion. [1]

2.3 State what inference uses a sample to estimate. [1]

3 Exam-style questions

3.1 Inference for proportions relies on the _____ distribution. [1]

- **A** binomial
- **B** normal
- **C** uniform
- **D** skewed

3.2 The large counts condition requires np and $n(1 - p)$ to each be at least [1]

- **A** 1
- **B** 5
- **C** 10
- **D** 30

3.3 A sample proportion is used to estimate a population proportion.

(a) Name the distribution used for inference. [1]

(b) State the condition for it to apply. [1]

(c) State what we are estimating. [1]

Solutions

2.1 the sampling distribution of $\hat{p}$ is approximately normal, allowing z -based inference.

2.2 $np \geq 10$ and $n(1 - p) \geq 10$.

2.3 the unknown population proportion p .

3.1 B.

3.2 C.

3.3 (a) the normal distribution. (b) $np \geq 10$ and $n(1 - p) \geq 10$. (c) the population proportion p .