

EXAM-DAY · 90-MIN REVISION CARD

## Inferential Statistics

Print this · Fold it · Carry to the exam-hall gate · Revise once · Then walk in.

### FORMULAS & KEY RESULTS

Standard Error of mean:  $SE = \sigma/\sqrt{n}$  (use  $s$  if  $\sigma$  unknown,  $n \geq 30$ )

Sampling distribution of  $\bar{x}$ :  $E(\bar{x}) = \mu$ ,  $SD(\bar{x}) = \sigma/\sqrt{n}$

CLT: for  $n > 30$ ,  $\bar{x} \sim \text{Normal}(\mu, \sigma^2/n)$  approximately, ANY population

95% CI for  $\mu$  (large  $n$ ):  $\bar{x} \pm 1.96 \times SE$

99% CI for  $\mu$  (large  $n$ ):  $\bar{x} \pm 2.58 \times SE$

90% CI for  $\mu$  (large  $n$ ):  $\bar{x} \pm 1.645 \times SE$

Small-sample CI ( $n < 30$ ,  $\sigma$  unknown):  $\bar{x} \pm t_{(\alpha/2, n-1)} \times s/\sqrt{n}$

One-sample z-test statistic:  $z = (\bar{x} - \mu_0)/(\sigma/\sqrt{n})$

One-sample t-test statistic:  $t = (\bar{x} - \mu_0)/(s/\sqrt{n})$ ,  $df = n-1$

Critical z-values:  $\pm 1.96$  (two-tailed 5%),  $\pm 2.58$  (two-tailed 1%),  $1.645$  (one-tailed 5%)

Chi-square test of independence:  $\chi^2 = \sum (O - E)^2/E$ ,  $df = (r-1)(c-1)$

Type I error =  $P(\text{reject } H_0 \mid H_0 \text{ true}) = \alpha$ ; Type II error =  $P(\text{fail to reject } H_0 \mid H_0 \text{ false}) = \beta$

Decision rule (two-tailed): reject  $H_0$  if  $|z_{\text{calc}}| > z_{\text{critical}}$ , else fail to reject

p-value approach: reject  $H_0$  if  $p < \alpha$

### TOP 5 PYQ PATTERNS

**1 Construct a CI for  $\mu$  given  $n, \bar{x}, \sigma$**

3 marks · 82% of years  
Substitute into  $\bar{x} \pm z \cdot \sigma/\sqrt{n}$ ; quote  $z$  for the stated confidence level.

**2 One-sample z-test on a claimed mean**

4 marks · 71% of years  
Always:  $H_0, H_1, \alpha, z_{\text{calc}}$ , compare, decision, contextual conclusion.

**3 Identify the sampling technique used in a scenario**

2 marks · 57% of years  
Match to definitions; stratified = subgroup-proportional, cluster = whole groups picked.

**4 State CLT and find SE for a sampling distribution**

2 marks · 64% of years  
 $SE = \sigma/\sqrt{n}$ ; CLT statement must mention 'large  $n$ ' and 'regardless of population shape'.

**5 Distinguish Type I vs Type II error in a real context**

2 marks · 39% of years  
Type I = false alarm; Type II = miss. Anchor to the  $H_0$  in the question.

### 90-MIN REVISION FLOW

**0-15 min**

Population vs sample, parameter vs statistic — copy the 4-row table from notes.

**15-30 min**

Sampling methods — write one-line definition + one example for each of the 5 methods.

**30-50 min**

CLT statement + SE formula + 2 numerical SE problems.

**50-70 min**

Construct one 95% CI + one 99% CI from past papers (full working).

**70-90 min**

One full z-test problem (5 steps) + spot-check Type I vs Type II + p-value interpretation.

**Confidence, not anxiety.** You've practised this all year. Trust your steps. Don't change strategy on exam morning.  
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