

2.3 Statistics for Two Categorical Variables

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS independent 独立 • conditional distribution 条件分布

Objective

Build the skills to answer exam questions on **statistics for two categorical variables**.

You must be able to:

- compare **conditional distributions** 条件分布 across categories
- decide whether two categorical variables show an **association** or appear **independent** 独立
- interpret **differences in proportions** between groups in context

1 Worked examples

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

■ Comparing conditional distributions

To check for a relationship, compare the **conditional distributions** of one variable across the categories of the other.

■ Association vs independence

- If the conditional distributions are **noticeably different**, there is an **association**.
- If they are **about the same**, the variables appear **independent**.

Always describe the **difference in proportions** in context — and remember association is **not** causation.

2 Practice

2.1 State how to check for an association between two categorical variables. [1]

2.2 State what it means for two categorical variables to appear independent. [1]

2.3 In group A, 40% buy; in group B, 70% buy. State whether there is an association.[1]

3 Exam-style questions

3.1 Two categorical variables appear independent if their conditional distributions are[1]

- **A** very different
 - **B** roughly the same
 - **C** exactly zero
 - **D** categorical
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3.2 An association is shown by [1]

- **A** equal proportions across groups
 - **B** differences in proportions across groups
 - **C** a single variable
 - **D** a mean
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3.3 Among smokers, 30% cough daily; among non-smokers, 5% do.

(a) Find the difference in proportions. [1]

(b) State whether there is an association. [1]

(c) State one caution about concluding causation. [1]

Solutions

2.1 compare the conditional distributions across the categories of one variable.

2.2 their conditional distributions are roughly the same.

2.3 yes — the proportions differ noticeably.

3.1 B.

3.2 B.

3.3 (a) $30\% - 5\% = 25$ percentage points. (b) yes, there is an association. (c) an association does not prove that one variable causes the other.