

2.3 Statistics for Two Categorical Variables

Name: _____ Class: _____ Date: _____

Total: 8 marks

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
-

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]

4 Go further

- work through the **2.3 Statistics for Two Categorical Variables** lesson on the **Learn** page;
- read the **Exploring Two-Variable Data** section of the AP Statistics handout on the **Know** page.

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.