

6.7 Potential Errors When Performing Tests

Name: _____ Class: _____ Date: _____

Total: 8 marks

Objective

Build the skills to answer exam questions on **potential errors in tests**.

You must be able to:

- describe a **Type I error** 第一类错误 (rejecting a true H_0)
- describe a **Type II error** 第二类错误 (failing to reject a false H_0)
- describe the **power** 功效 of a test

1 Worked examples

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

■ Two kinds of error

- **Type I** —reject H_0 when it is actually **true** (a false alarm). Its probability is α .
- **Type II** —fail to reject H_0 when it is actually **false** (a missed effect). Its probability is β .

■ Power

Power = $1 - \beta$ —the probability of correctly detecting a real effect (rejecting a false H_0).

2 Practice

2.1 Define a Type I error. [1]

2.2 Define a Type II error. [1]

2.3 State what the power of a test measures. [1]

3 Exam-style questions

3.1 A Type I error is [1]

- **A** rejecting a true H_0
 - **B** failing to reject a false H_0
 - **C** a correct decision
 - **D** a form of bias
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3.2 The probability of a Type I error equals [1]

- **A** β
 - **B** α
 - **C** the power
 - **D** 0
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3.3 A drug that does **not** work is declared effective by a test.

(a) Name this type of error. [1]

(b) Name the error of missing a drug that **does** work. [1]

(c) Name the probability of correctly detecting a real effect. [1]

4 Go further

- work through the **6.7 Potential Errors When Performing Tests** lesson on the **Learn** page;
- read the **Inference for Categorical Data: Proportions** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 rejecting H_0 when it is actually true.

2.2 failing to reject H_0 when it is actually false.

2.3 the probability of correctly rejecting a false H_0 (detecting a real effect).

3.1 A.

3.2 B.

3.3 (a) a Type I error. (b) a Type II error. (c) power.