

# 6.7 Potential Errors When Performing Tests

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 8 marks

**KEY WORDS** type i error 第一类错误 • type ii error 第二类错误 • power 功效

## Objective

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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

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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  $\alpha$ .
- **Type II** — fail to reject  $H_0$  when it is actually **false** (a missed effect). Its probability is  $\beta$ .

### ■ Power

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

## 2 Practice

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2.1 Define a Type I error. [1]

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2.2 Define a Type II error. [1]

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

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## 3 Exam-style questions

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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**  $\beta$
  - **B**  $\alpha$
  - **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]

## Solutions

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**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.