

Exercise walk-through

6.7

Potential Errors When Performing Tests

AP Statistics

Type I and Type II errors

A test on chance data can err two ways:

- **Type I** : reject a *true* H_0 (false alarm) – prob. α
- **Type II** : miss a *false* H_0 – prob. β

Power = $1 - \beta$ rises with larger n , a bigger true effect, or larger α .

	H_0 true	H_0 false
reject	Type I (α) correct (power)	
fail	correct	Type II (β)

The two errors, and writing the conclusion

the significance level

α – fixed **before** the data are seen; usually 0.05

the alternative hypothesis

H_a – one-sided or two-sided, chosen from the question, never from the data

a Type I error

rejecting a **true** H_0 – a false alarm. Its probability is α

a Type II error

failing to reject a **false** H_0 – a missed detection. Its probability is β

power

$1 - \beta$: the chance of detecting a real effect. Raised by a larger sample or a larger α

two proportions

use the **combined (pooled)** estimate of p in the standard error for the *test*, but not for the interval

Always write the conclusion **in context**, describing each error and **its consequence in the problem's own terms** – that sentence is where the marks are.

Exercises 2.1-2.3

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]

Exercises 2.1-2.3

2.1 Define a Type I error.

[1]

2.1

- rejecting H_0 when it is actually true
-

2.2 Define a Type II error.

[1]

2.2

- failing to reject H_0 when it is actually false
-

2.3 State what the power of a test measures.

[1]

2.3

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

Exercises 3.1-3.2

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

3.2 The probability of a Type I error equals

[1]

☐

A β

B α

C the power

D 0

Exercises 3.1-3.2

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

3.1 A

- rejecting a true H_0 .

3.2 The probability of a Type I error equals

[1]

☐

- A β
- B α
- C the power
- D 0

3.2 B

- α .

Exercise 3.3 (a)

3.3 A drug that does **not** work is declared effective by a test.

(a) Name this type of error.

[1]

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(a) Name this type of error.

[1]

(a)

- a Type I error

Exercise 3.3 (b)

3.3 A drug that does **not** work is declared effective by a test.

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

[1]

Exercise 3.3 (b)

3.3 A drug that does **not** work is declared effective by a test.

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

[1]

(b)

- a Type II error

Exercise 3.3 (c)

3.3 A drug that does **not** work is declared effective by a test.

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

[1]

Exercise 3.3 (c)

3.3 A drug that does **not** work is declared effective by a test.

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

[1]

(c)

- power