

Exercise walk-through

Biased and Unbiased Point Estimates ■ 5.4

eXercise

You must be able to

- describe a **point estimate** 点估计 of a parameter
- explain what makes an estimator **unbiased** 无偏
- recognise the sample mean and sample proportion as unbiased estimators

Method — Point estimates

A **point estimate** is a single value from a sample used to estimate a population parameter — for example, using $\bar{x}$ to estimate μ .

Method — Unbiased estimators

An estimator is **unbiased** if its sampling distribution is **centred on the true parameter** — on average, it neither over- nor under-estimates. The sample mean $\bar{x}$ and sample proportion $\hat{p}$ are unbiased.

Practice 2.1 ■ 1 mark

Define a point estimate.

Solution 2.1

Method: Point estimates

Worked steps

a single value from a sample used to estimate a population parameter **B1**.

Practice 2.2 ■ 1 mark

State what it means for an estimator to be unbiased.

Solution 2.2

Method: Unbiased estimators

Worked steps

its sampling distribution is centred on the true parameter **B1**.

Practice 2.3 ■ 1 mark

State one example of an unbiased estimator.

Solution 2.3

Method: Unbiased estimators

Worked steps

the sample mean $\bar{x}$ or the sample proportion $\hat{p}$ (any one) **B1**.

Exam-style 3.1 ■ 1 mark

A single value used to estimate a parameter is a

A parameter

B point estimate

C population

D census

Solution 3.1

Method: Point estimates

- A parameter
- B point estimate 
- C population
- D census

Worked steps

B.

Exam-style 3.2 ■ 1 mark

An unbiased estimator is centred on the

- A** sample
- B** true parameter
- C** value zero
- D** maximum

Solution 3.2

Method: Unbiased estimators

- A sample
- B true parameter**
- C value zero
- D maximum



Worked steps

B.

Exam-style 3.3 ■ 1 mark

The sample mean $\bar{x}$ is used to estimate μ .

- (a) Name this kind of value.
- (b) State what “unbiased” means for $\bar{x}$.
- (c) State what $\bar{x}$ estimates.

Solution 3.3

Worked steps

(a) a point estimate **B1**. (b) its sampling distribution is centred at μ **B1**. (c) the population mean μ **B1**.