

Exercise walk-through

Constructing a Confidence Interval for a Population Mean ■ 7.2

eXercise

You must be able to

- construct the interval $\bar{x} \pm t^* \frac{s}{\sqrt{n}}$
- use degrees of freedom $n - 1$
- compute the margin of error

Method — The confidence interval

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}},$$

where $\frac{s}{\sqrt{n}}$ is the **standard error**, the **margin of error** is $t^* \frac{s}{\sqrt{n}}$, and the degrees of freedom are $n - 1$.

Method — Example

$$\bar{x} = 50, s = 10, n = 25, t^* = 2.06: SE = \frac{10}{5} = 2, ME = 2.06 \times 2 = 4.12.$$

Practice 2.1 ■ 1 mark

Write the confidence-interval formula for a mean.

Solution 2.1

Method: The confidence interval

Worked steps

$$\bar{x} \pm t^* \frac{s}{\sqrt{n}} \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

State the degrees of freedom for a one-sample t interval with $n = 25$.

Solution 2.2

Method: The confidence interval

Worked steps

$$n - 1 = 24 \quad \text{B1}.$$

Practice 2.3 ■ 2 marks

$\bar{x} = 50$, $s = 10$, $n = 25$, $t^* = 2.06$. Find the margin of error.

Solution 2.3

Method: The confidence interval

Worked steps

$$ME = 2.06 \times \frac{10}{\sqrt{25}} = 2.06 \times 2 = 4.12 \quad \text{M1} \quad \text{A1}.$$

Exam-style 3.1 ■ 1 mark

A confidence interval for a mean uses the _____ critical value.

A z^*

B t^*

C p

D χ^2

Solution 3.1

Method: The confidence interval

A z^*

B t^*



C p

D χ^2

Worked steps

B.

Exam-style 3.2 ■ 1 mark

The degrees of freedom for a one-sample t interval are

A n

B $n - 1$

C $n + 1$

D $2n$

Solution 3.2

Method: The confidence interval

A n

B $n - 1$



C $n + 1$

D $2n$

Worked steps

B.

Exam-style 3.3 ■ 1 mark

$\bar{x} = 80$, $s = 12$, $n = 36$, $t^* = 2.03$.

(a) Find the standard error $\frac{s}{\sqrt{n}}$.

(b) Find the margin of error.

Solution 3.3

Method: The confidence interval

Worked steps

$$(a) \frac{12}{\sqrt{36}} = 2 \quad \text{B1}. \quad (b) \text{ME} = 2.03 \times 2 = 4.06 \quad \text{M1} \quad \text{A1}.$$