

Exercise walk-through

Setting Up a Test for a Population Mean ■ 7.4

eXercise

You must be able to

- state the hypotheses $H_0 : \mu = \mu_0$ and H_a
- write the test statistic $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$
- state the degrees of freedom $n - 1$

Method — Hypotheses

- **Null** $H_0 : \mu = \mu_0$.
- **Alternative** $H_a : \mu \neq \mu_0$ (or $<$, or $>$).

Method — Test statistic

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}, \quad \text{df} = n - 1.$$

Method — Example

$$\bar{x} = 52, \mu_0 = 50, s = 8, n = 16: t = \frac{52 - 50}{8/\sqrt{16}} = \frac{2}{2} = 1.0.$$

Practice 2.1 ■ 1 mark

State the null hypothesis for a test about a mean.

Solution 2.1

Worked steps

$$H_0 : \mu = \mu_0 \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

Write the test-statistic formula for a mean.

Solution 2.2

Method: Test statistic

Worked steps

$$t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}} \quad \text{B1}.$$

Practice 2.3 ■ 2 marks

$\bar{x} = 52$, $\mu_0 = 50$, $s = 8$, $n = 16$. Find the test statistic t .

Solution 2.3

Method: Test statistic

Worked steps

$$t = \frac{52 - 50}{8/\sqrt{16}} = \frac{2}{2} = 1.0 \quad \text{M1} \quad \text{A1}.$$

Exam-style 3.1 ■ 1 mark

The test statistic for a mean is

A $\frac{\bar{x} - \mu_0}{s/\sqrt{n}}$

B $\frac{\hat{p} - p_0}{SE}$

C $\bar{x} \cdot s$

D $\frac{\mu_0}{n}$

Solution 3.1

Method: Test statistic

A $\frac{\bar{x} - \mu_0}{s/\sqrt{n}}$



B $\frac{\hat{p} - p_0}{SE}$

C $\bar{x} \cdot s$

D $\frac{\mu_0}{n}$

Worked steps

A.

Exam-style 3.2 ■ 1 mark

The degrees of freedom for a one-sample mean test are

A n

B $n - 1$

C $n + 1$

D 0

Solution 3.2

A n

B $n - 1$



C $n + 1$

D 0

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A test of $\mu \neq 100$ has $\bar{x} = 104$, $s = 10$, $n = 25$.

- (a) Write H_0 .
- (b) Compute t .
- (c) State the degrees of freedom.

Solution 3.3

Worked steps

(a) $H_0 : \mu = 100$ **B1**. (b) $t = \frac{104 - 100}{10/\sqrt{25}} = \frac{4}{2} = 2.0$ **M1** **A1**. (c) 24 **B1**.