Hypothesis tests for a population mean

Learn and practise | Free preview

A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. A scientific, statistical or financial calculator, or suitable spreadsheet, can support these calculations. Record the formula, inputs and interpretation.

What you will practise

• Hypothesis testing for a population mean

Useful starting skills: Specialist and Methods Units 1–2; concurrent or completed Mathematical Methods Units 3–4.

State the null and alternative hypotheses before examining the result. For a normal population with known σ, or an appropriate large-sample approximation, standardise the sample mean as $z=(xbar-\mu_0)/(\sigma/\sqrt{n})$. Match the tail or tails to the alternative hypothesis.

The p-value is the probability, calculated under the null model, of a result at least as extreme in the direction specified by the alternative. Reject H_0 when $p\leq\alpha$. Otherwise say there is insufficient evidence against H_0; this does not prove it true.

Worked example

A normal population has known σ=8. Test H_0: μ=50 against H_1: μ≠50 using n=16 and xbar=54. Use α=0.05 and Φ(2)=0.97725.

Standard error=8/4=2

z=(54-50)/2=2

p=2(1-0.97725)=0.0455.

Answer: z=2; two-sided p=0.0455. Reject H_0 at 5%.

Try it yourself

Name: _____ Date: _____

1. Write hypotheses for a claim that a population mean has increased above 20.

2. Given μ_0=100, known σ=12, n=36 and xbar=104, find z.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. H_0: $\mu=20$; H_1: $\mu>20$.

The alternative is an upper-tail claim about the population mean.

2. 2.

Standard error=12/6=2; standardise the difference of 4.

Curriculum reference: Specialist Mathematics Units 3–4 — Hypothesis testing for a population mean

Independent original resource. Not published or endorsed by VCAA. This focused set supports the listed skills; it is not a complete course or an official assessment.

This free preview may be shared intact with attribution. Not for sale.