



Hypothesis Testing - Null and Alternative Hypotheses

- Question 1

1. Company XYZ manufactures calculators with an average mass of 450g. An engineer believes that average weight to be different and decides to calculate the average mass of 50 calculators. State the null and alternative hypotheses.

Question 1

- Null Hypothesis (H_0)
 - It is the current claim or the accepted value that the majority holds to be true
- Alternative Hypothesis (H_a)
 - It is the contender or contradictory to the null hypothesis
 - It is what the researchers try to prove to disprove the null hypothesis
 - The null hypothesis is likely to be correct if the researchers fail to disprove it
- Check if the statement is about the mean or proportion
 - The keyword “average mass” means it is the mean (μ)
 - It is about proportion if there is a mention of “percentage” or “%”
 - Null Hypothesis (H_0) is given by $\mu = 450g$
 - Alternative Hypothesis (H_a) is given by $\mu \neq 450g$
- Answer 1

Null: H_0 $\mu = 450g$

Alternative: H_a $\mu \neq 450g$

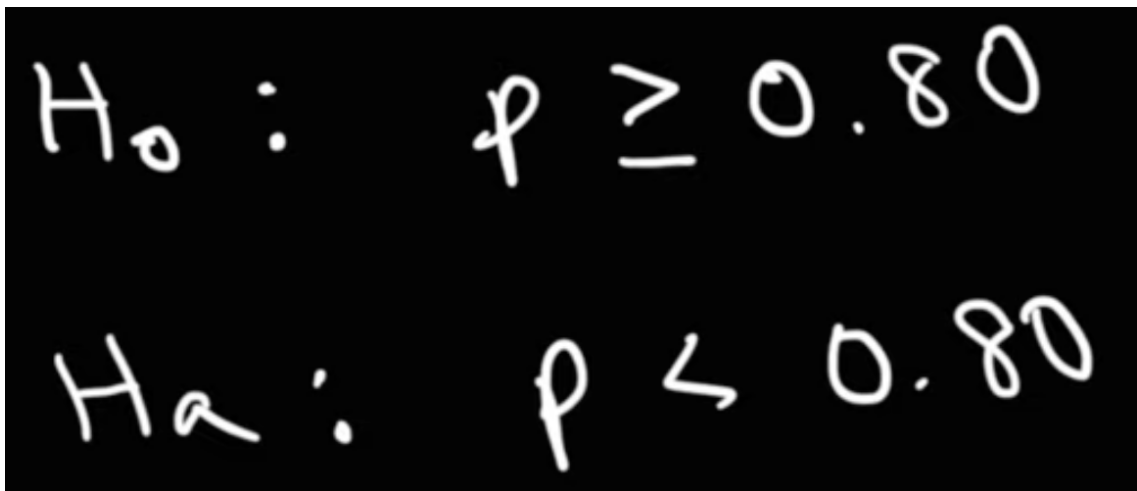
Answer 1

- Question 2

2. The teachers in a school believes that at least 80% of students will complete high school. A student disagrees with this value and decides to conduct a test. State the null and alternative hypotheses.

Question 2

- Check if the statement is about the mean or proportion
 - The keyword “percentages” or “%” is mentioned so it deals with proportions
 - Null Hypothesis (H_0) is given by $p \geq 0.80$
 - Alternative Hypothesis (H_a) is given by $p < 0.80$
- Answer 2



Handwritten text on a black background showing the null hypothesis $H_0: p \geq 0.80$ and the alternative hypothesis $H_a: p < 0.80$.

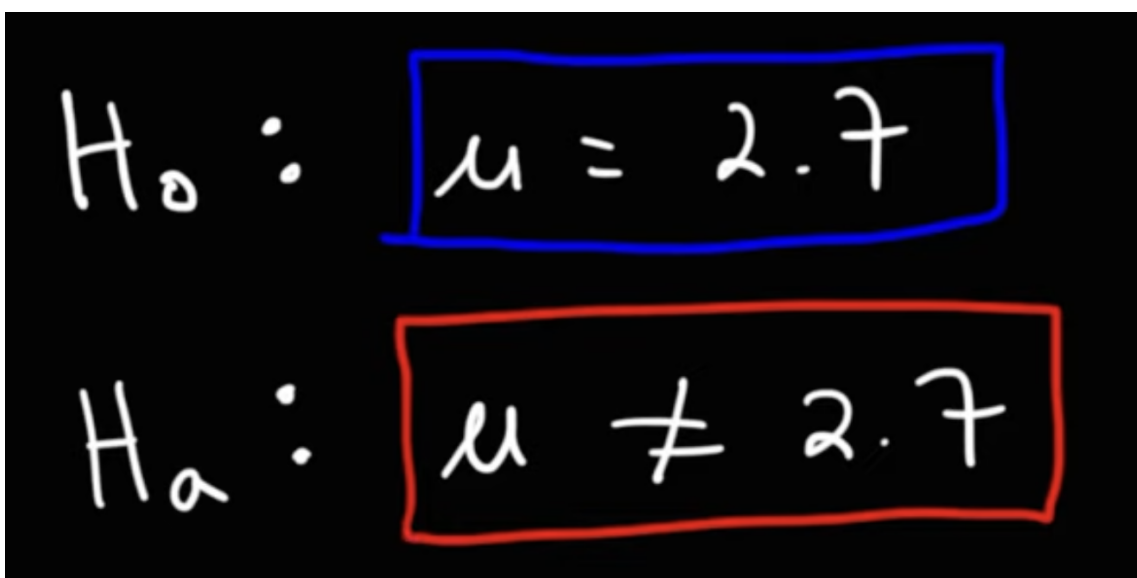
Answer 2

- Question 3

3. A teacher wishes to test if the average GPA of students in the high school is different from 2.7. State the null and alternative hypotheses.

Question 3

- Check if the statement is about the mean or proportion
 - The keyword “average GPA” means it is the mean (μ)
 - Alternative Hypothesis (H_a) is given by $\mu \neq 2.7$
 - Null Hypothesis (H_0) is given by $\mu = 2.7$
 - The teacher tries to disprove the accepted value
- Answer 3



Handwritten text on a black background showing the null hypothesis $H_0: \mu = 2.7$ and the alternative hypothesis $H_a: \mu \neq 2.7$. The expressions $\mu = 2.7$ and $\mu \neq 2.7$ are enclosed in blue and red boxes, respectively.

Answer 3

- Question 4

4. The percentage of residents who own a vehicle in town XYZ is no more than 75%. A researcher disagrees with the value and decides to survey 100 residents asking them if they own a vehicle. State the null and alternative hypotheses.

Question 4

- Check if the statement is about the mean or proportion
 - The keyword “percentages” or “%” is mentioned so it deals with proportions
 - Null Hypothesis (H_0) is given by $p \leq 0.75$
 - Alternative Hypothesis (H_a) is given by $p > 0.75$
- Answer 4

The image shows handwritten mathematical expressions for the null and alternative hypotheses. The null hypothesis is $H_0: p \leq 0.75$ and the alternative hypothesis is $H_a: p > 0.75$. Both expressions are written in white on a black background, with the inequalities and the numerical value 0.75 enclosed in blue hand-drawn rectangular boxes.

$$H_0: p \leq 0.75$$
$$H_a: p > 0.75$$

Answer 4