

## Week 9 - Quiz

### Problem 1

If my null hypothesis is "Dutch people do not differ from English people in height", what is my alternative hypothesis?

- A. All of the statements are plausible alternative hypotheses.
- B. Dutch people are taller than English people.
- C. English people are taller than Dutch people.
- D. Dutch people differ in height from English people.

**Correct Answer: D**

"Do not differ"  $\Rightarrow$  " $=$ " ;  $H_0 =$  vs  $H_a : \neq$   
Therefore D is correct.

### Problem 2

If my experimental hypothesis were "Eating cheese before bed affects the number of nightmares you have", what would the null hypothesis ( $H_0$ ) be?

- A. Eating cheese before bed gives you more nightmares.
- B. Eating cheese before bed gives you fewer nightmares.
- C. Eating cheese is linearly related to the number of nightmares you have.
- D. The number of nightmares you have is not affected by eating cheese before bed.

**Correct Answer: D**

"affects"  $\Rightarrow$  " $\neq$ " therefore :  $H_0 =$  "Do not affect"  
 $H_a : \neq$  "affect"

### Problem 3

In hypothesis testing, the hypothesis which is tentatively assumed to be true is called the

- A. correct hypothesis
- B. null hypothesis
- C. alternative hypothesis
- D. level of significance

**Correct Answer: B**

By the logic of testing hypothesis.

**Problem 4**

A researcher claims that 62% of voters favor gun control. Determine the null and alternative hypotheses.

- A  $H_0: p \neq 0.62$  vs.  $H_a: p = 0.62$
- B  $H_0: p \geq 0.62$  vs.  $H_a: p < 0.62$
- C  $H_0: p < 0.62$  vs.  $H_a: p \geq 0.62$
- D  $H_0: p \geq 0.62$  vs.  $H_a: p < 0.62$
- E  $H_0: p = 0.62$  vs.  $H_a: p \neq 0.62$

**Correct Answer: E**

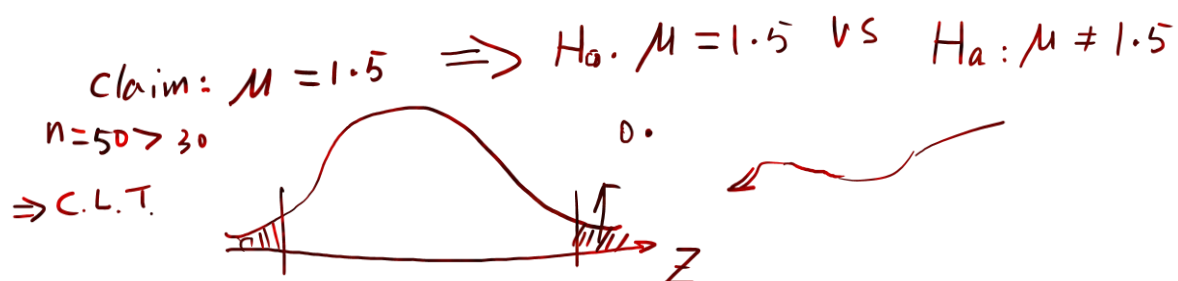
claim:  $p = 0.62$ . does ~~not~~ have an equal sign,  
 $H_0: p = 0.62$  vs.  $H_a: p \neq 0.62$

**Problem 5**

Nestor Milk Powder is sold in packets with an advertised mean weight of 1.5kgs. The standard deviation is known to be 184 grams. A consumer group wishes to check the accuracy of the advertised mean and takes a sample of 52 packets finding an average weight of 1.49kgs. What is the set of hypotheses that should be used to test the accuracy of advertised weight?

- A  $H_0: \mu = 1.5$  vs  $H_a: \mu \neq 1.5$
- B  $H_0: \mu = 1.5$  vs  $H_a: \mu < 1.5$
- C  $H_0: x = 1.49$  vs  $H_a: x \neq 1.49$
- D  $H_0: x = 1.5$  vs  $H_a: x < 1.5$

**Correct Answer: A**



**Problem 6**

Mr. Rumpole *believes that* the mean income of lawyers is now *more than* \$65000 thousand per year. Which is the correct set of hypotheses to test this belief?

- A  $H_0: \mu \geq 65000$  vs  $H_a: \mu < 65000$
- B  $H_0: \mu \leq 65000$  vs  $H_a: \mu > 65000$
- C  $H_0: \mu = 65000$  vs  $H_a: \mu \neq 65000$
- D  $H_0: \mu < 65000$  vs  $H_a: \mu \geq 65000$

**Correct Answer: B**

Claim:  $\mu > 65000 \Rightarrow H_0: \mu \leq 65000$  vs  $H_a: \mu > 65000$

**Problem 7**

Suppose a businessperson wishes to open a store in a local shopping center only if there is strong evidence that the average number of people in the center is *greater than* 5000 per day. The null hypothesis will be

- A  $H_0: \mu \leq 5000$
- B  $H_0: \mu > 5000$
- C  $H_0: \mu \geq 5000$
- D  $H_0: \mu < 5000$

**Correct Answer: A**

Claim:  $\mu > 5000$   
 $\Rightarrow H_0: \mu \leq 5000$

**Problem 8**

A manufacturer of chocolate toppings uses machines to dispense liquid ingredients into bottles that move along a filling line. The machine that dispenses toppings is working properly when 8 grams are dispensed. The standard deviation of the process is 0.15 grams. A sample of 50 bottles is selected periodically and the filling line is stopped *if there is evidence that the average amount dispensed is less than* 8 grams. Suppose that the average amount dispensed in a sample of 50 bottles is 7.983 grams. What is the null hypothesis ( $H_0$ )?

- A.  $\mu < 8$
- B.  $\mu \geq 8$
- C.  $\mu > 8$
- D.  $\mu \leq 8$
- E.  $\mu = 8$

**Correct Answer: B**

claim:  $\mu < 8$

$\Rightarrow H_0: \mu \geq 8$  vs  $H_a: \mu < 8$

### Problem 9

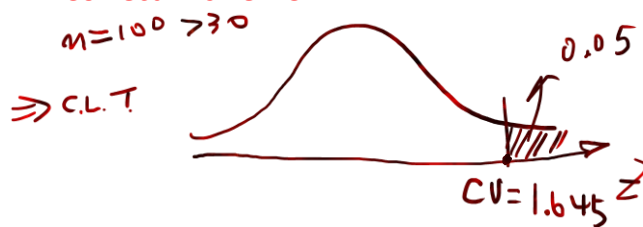
The standard deviation of a large population is 20. To test

$$H_0: \mu \leq 4 \text{ vs. } H_a: \mu > 4$$

at a level of significance of .05, a sample of size 100 will be taken.  
You will reject  $H_0$  if the test statistic

- A.  $TS \geq 1.96$
- B.  $TS \geq 0.95$  or  $TS \leq -1.96$
- C.  $TS \geq 1.645$
- D.  $TS \geq 1.645$  or  $TS \leq -1.645$
- E.  $TS > 1.285$

**Correct Answer: C**



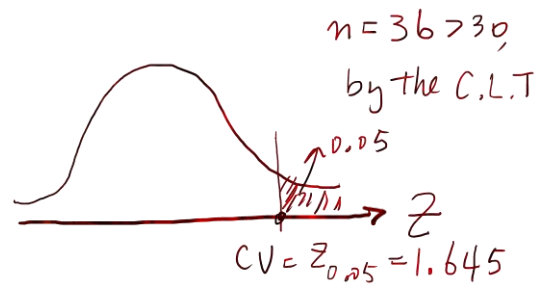
### Problem 10

We are interested in conducting a test with the following hypothesis  $H_0: \mu = 20$  vs.  $H_a: \mu > 20$ . If the sample size is 36,  $s = 12$ , the *population is normal*, and the level of significance is 0.05, what is the rejection region for this test? Reject  $H_0$  if

- A.  $TS < 1.753$
- B.  $TS > 2.575$
- C.  $TS > 1.96$
- D.  $TS > 1.645$

**Correct Answer: D**

$$H_a: \mu > 20$$



**Problem 11.**

The null hypothesis is rejected if

- A. The null hypothesis is true.
- B. The alternative hypothesis is true.
- C. The p-value is less or equal to the significance level.
- D. The p-value is larger than the significance level.

**Answer: C.**

**Problem 12.**

For a two-tailed normal test, the p-value is defined to be

- A). The area to the right of the test statistic of the normal density curve.
- B). The area to the left of the test statistic of the normal density curve.
- C). The area between the two critical values in the normal density curve.
- D). Two times of the smaller tail area.

**Answer D.**

**Problem 13.**

Given  $H_0: \mu = 25$ ,  $H_a: \mu \neq 25$ , and P-value = 0.041. Do you reject or fail to reject  $H_0$  at the 0.01 level of significance?

- A) fail to reject  $H_0$
- B) not sufficient information to decide
- C) reject  $H_0$

**Answer: A.**

**Problem 14.**

The area **to the left** of the test statistic is 0.375. What is P- the value if this is a **right tail test**?

- A ) 0.625
- B ) 0.1885
- C ) 0.750
- D ) 0.375

**Answer: A.  $1 - 0.375 = 0.625$**

#### **Problem 15**

The area to the left of the test statistic is 0.375. What is the P- value if this is a two-tail test?

- A ) 0.625
- B ) 0.750
- C ) 0.375
- D ) 0.1885

**Answer: B. Double the smaller tail area.**

## Summary of Weekly Quiz #9

### 1. Five Number Summary :

The five-number summary is used to describe the shape of the distribution of a given numerical data. It consists of five numbers: minimum data value, first quartile, median, the third quartile, and the maximum data value.

The five-number summary of this given data set is:

| stats   | value  |
|---------|--------|
| Min.    | 60.00  |
| 1st Qu. | 85.00  |
| Median  | 90.00  |
| 3rd Qu. | 90.00  |
| Max.    | 100.00 |

### 2. Boxplot :

The boxplot is a geometric representation of the five-number summary. The boxplot of the given data set is given below.

