

IncorrectQuestion 1

0 / 3.5 pts

Dr. Jones wishes to improve people's memory for names. On average, people can remember the names of 5 people to whom they have recently been introduced. The population standard deviation is 2.5. The shape of the distribution is normal. After a group of 9 people take Dr. Jones's course, they are able to remember on average 7 names of people to whom they are introduced. If the null hypothesis is true, what would be the probability of the sample mean for this problem?

Background Information: We are told that Dr. Jones wishes to improve people's memory for names. The word problem first tells us the population mean ('On average, people can remember the names of 5 people to whom they have recently been introduced.'). Next, we are told the population standard deviation ('The population standard deviation is 2.5.'). We are also told that the distribution is normal ('The shape of the distribution is normal.'). Because we are given the population standard deviation and we know that the distribution is normal, we can use the Z-test. Next, we are told the sample size ('After a group of 9 people take Dr. Jones's course'). Finally, we are told the sample mean ('they are able to remember on average 7 names of people to whom they are introduced.').

$$Z\text{-test} = [(Sample\ Mean) - (Population\ Mean)] / [Standard\ Error]$$

We are already given the sample mean (7) and the population mean (5). But we need to calculate the Standard Error. This is done by dividing the standard deviation by the square root of the sample size. The standard error is equal to $2.5 / \sqrt{9} = 2.5 / 3 = 0.83$.

$$Z\text{-test} = [(7) - (5)] / [0.83] = 2 / 0.83 = 2.41$$

Answer: Using the Z-table, the probability of a Z-test that is 2.41 or greater is 0.008.

The Z-test result tells us that if the null hypothesis is correct, we can still expect to see a sample mean of 5 occur due to chance about 0.008 of the time.

Question 2

3.5 / 3.5 pts

Joe randomly selects a sample of 16 people, and gives them a treatment. He then wants to evaluate the evidence regarding whether his treatment had an effect. Here's the data:
The mean for his sample is 85. The mean for the population is 92, with a standard deviation of 13.
Assume a normal distribution for the individual scores.

The Z-test let's the reader know the number of standard errors between the sample mean and the population mean.

Calculate and report the Z-test (*Round to the nearest hundredth*).

Good Job!

IncorrectQuestion 3

0 / 3.5 pts

The requirements for a Z-test is/are that....

we know the population mean and that the shape of the distribution of sample means is normal

we know the population standard deviation

the shape of the distribution of sample means is normal

we know the population standard deviation and that the shape of the distribution of sample means is normal

The requirements for a Z-test are that we know the population standard deviation and that the shape of the distribution of sample means is normal. If we do not know the population standard deviation (but instead must estimate it; then we can not use the Z-test... but will instead use something called a t test). If the distribution is not normal, then we can not use the Z table, which assumes a normal distribution (otherwise, the area beyond the Z would be meaningless).

IncorrectQuestion 4

0 / 5 pts

Joe believes that studying affects grades. The null hypothesis is that studying does not affect grades. If the null hypothesis is false, what is the probability that we will reject it?

that is unknown... it depends upon how helpful the studying was, and the size of the sample

none of the answers is correct

.95

.05

When the null hypothesis is false... that is entirely different from the null hypothesis being true. Again, when the null hypothesis is false, we might either retain the null or reject the null. Our decision will depend upon the evidence collected. Our evidence is more likely to be helpful in this case if studying was extremely helpful and if we had a large sample size. But we do not know any exact probabilities. Such exactness only exists when considering the null hypothesis to be true (because you can then see the exact distribution of what the data should look like when the null hypothesis is true... this is not possible for when the research hypothesis is true.. since we do not know how strong of an effect studying would have...).

Question 5

5 / 5 pts

If we retain the null hypothesis, when the null hypothesis is false, we have:

decreased power

made a Type II error

made a correct decision

made a Type I error

Good Job!

Question 6

3.5 / 3.5 pts

Jill is curious whether six year olds at her school are taller than 52 inches. She randomly selects 25 students, and finds that their average height is 54 inches (with a standard deviation of four inches). Should we reject the null hypothesis? *Note that this is a single sample t-test.*

Yes

No

Good Job!

Question 7

3.5 / 3.5 pts

Jill is curious whether six year olds at her school are taller than 52 inches. She randomly selects 25 students, and finds that their average height is 54 inches (with a standard deviation of four inches). What is the degrees of freedom for this problem?

Good Job!

Question 8

3.5 / 3.5 pts

John runs an experiment with an alpha of 0.05. He is able to reject the null. John then runs a second experiment with an alpha of .05.

Assume that the null hypothesis was correct both times... What's the probability of incorrectly rejecting the null hypothesis twice in a row? *Round to the nearest thousandth.*

Good Job!

IncorrectQuestion 9

0 / 3.5 pts

Carlos works at financial aid, and reimburses students up to \$2.50 for their lunch. He suspects that lunches now cost on average more than \$2.50, and so he decides to collect some data.

Research hypothesis: Lunches cost more than the hypothetical average of \$2.50.

Null hypothesis: Lunches cost the hypothetical average of \$2.50 or less.

Carlos randomly selects 25 students at the cafeteria, and with their permission records how much they spent on lunch. The sample mean is \$4.75. Based upon the sample, the estimated population standard deviation is \$1.20.

What statistical test should Carlos use to analyze his data?

Z test

Spearman's *rho*

Pearson's r

Single Sample t Test

The data should be analyzed with a single sample t test.

This is because we are comparing a sample mean against a known or hypothesized population mean. Additionally, we do not know if the population of scores is normally distributed, and we are estimating the population standard deviation. While it would be preferable to use the Z test (for a lower critical value).... doing so requires that the distribution of sample means is normal and that we know the population standard deviation.

Question 10

3.5 / 3.5 pts

Joe sends out a survey asking several college students their college major. Later, he sends out another survey to ask another group of college students their sex (male or female).

Assume that these two variables are **independent** of each other, and that the responses for each variable are mutually exclusive. Below are the frequency tables, showing his results for these questions.

Note: The Survey Results will be different for each test question.

Washington College (First Survey)

Major	Frequency
Psychology	14
Business	7
Dance	9
Chemistry	9

Washington College (Second Survey)

Students' Sex	Frequency
Male	24
Female	28

What is the probability of randomly selecting a college student at Washington who is both Female and a Psychology major? *Round to the nearest hundredth.*

Good Job!