Senior High School

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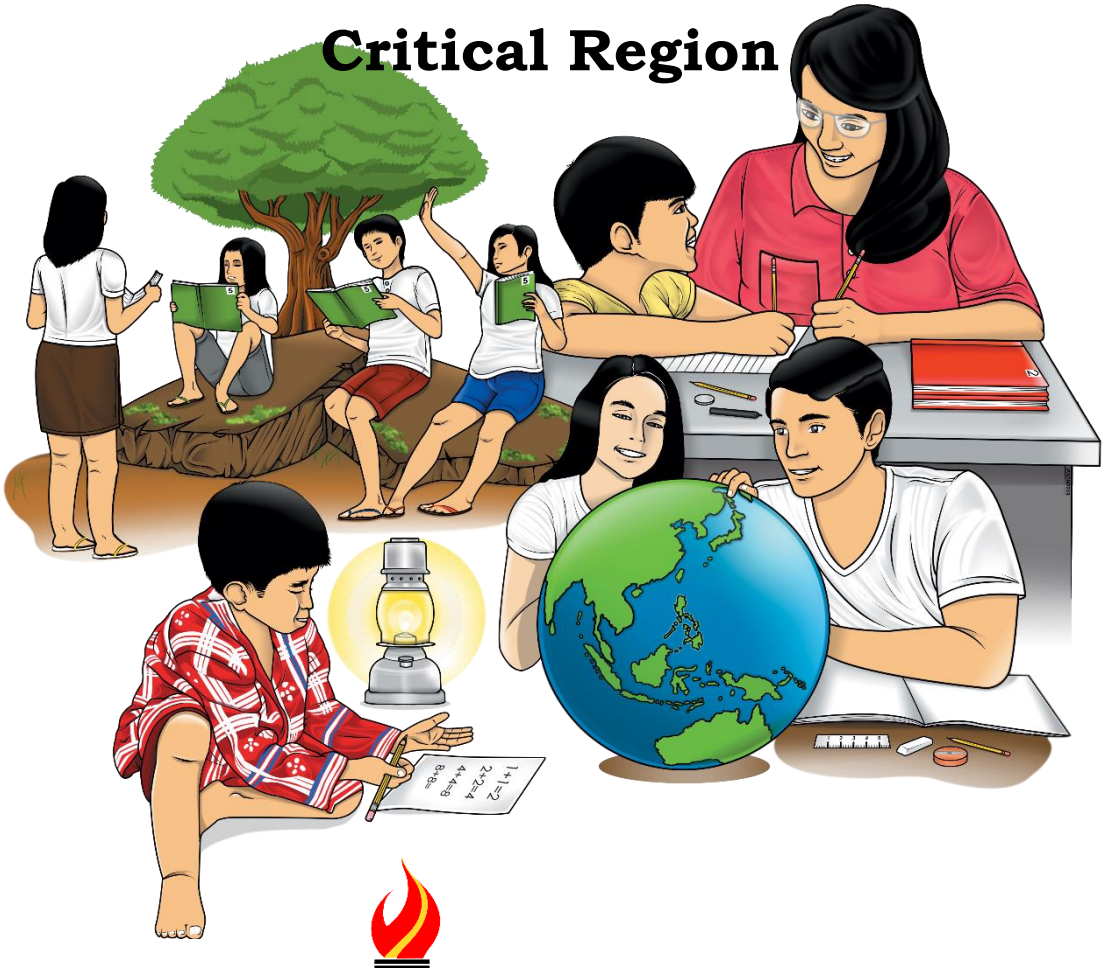
DEPARTMENT OF EDUCATION

Statistics and Probability

Quarter 4 – Module 7: Drawing Conclusion About Population Mean Based on Test Statistic Value and Critical Region



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Senior High School

Statistics and Probability

Module 7:
Drawing Conclusion About Population Mean Based on Test Statistic Value and Critical Region

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

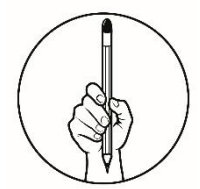
So far, you've already learned how to formulate null and alternative hypotheses, identify appropriate test statistic, look for critical values, identify the critical region, and compute for the value of the test statistic.

In this module, you will learn how to interpret the result based on the computed value of t-test and z-test. Perform each activity independently. If you find any difficulty in answering the exercises, you may consult your peers or ask the assistance of your teacher.

After going through this module, you are expected to:

1. recall and apply steps in hypothesis testing; and
2. draw conclusion about the population mean based on the test statistic value and the rejection region.

Before you proceed to the lesson, make sure to answer first the questions on the next page (What I Know).



What I Know

Choose the best answer to the given questions or statements. Write the letter of your choice on a separate sheet of paper.

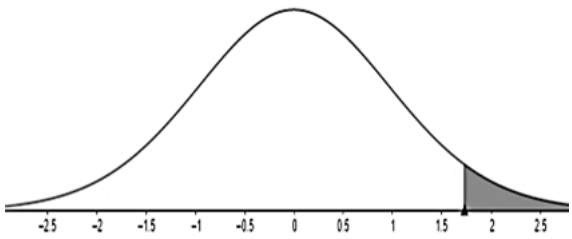
1. What is the critical value in a one-tailed test with 5% level of significance and a degree of freedom of 18?
   a.1.734 b. 2.101 c. 2.567 d. 2.898

2. If the absolute value of the computed test statistic is greater than the critical value, then we _____.
   a. retain the null hypothesis
   b. reject the null hypothesis
   c. reject the alternative hypothesis
   d. do not reject the null hypothesis

3. When we failed to reject the null hypothesis, which of the following statements is true?
   a. The conclusion is guaranteed.
   b. The conclusion is not guaranteed.
   c. There is enough evidence to back up the claim.
   d. There is no enough evidence to reject the claim.

4. If the t-computed value is 1.093 and the critical value is 1.699, what will be the decision?
   a. Reject both hypotheses.
   b. Reject the null hypothesis.
   c. Do not reject the null hypothesis.
   D. Support the alternative hypothesis.

5. On the given figure below, the t-computed value is 2.130. What conclusion can be drawn?

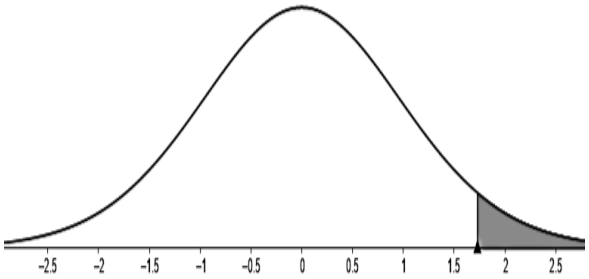


   a. Reject the null hypothesis.
   b. Fail to reject the null hypothesis.
   c. Reject only the alternative hypothesis.
   d. Reject both the null and alternative hypotheses.

6. What does it mean when the null hypothesis is rejected?
   a. The null hypothesis is incorrect.
   b. The alternative hypothesis is correct.
   c. There is sufficient evidence to support the null hypothesis.
   d. There is sufficient evidence to disprove the null hypothesis.

7. If the z-computed value is 2.505 and the critical value is 2.011, what will be the decision?
   a. Reject both hypotheses.
   b. Reject the null hypothesis.
   c. Support the null hypothesis.
   d. Do not reject the null hypothesis.

8. From the given figure below, the z-computed value is 1.375. What conclusion can be drawn?



   a. Reject the null hypothesis.
   b. Failed to reject the null hypothesis.
   c. Reject only the alternative hypothesis.
   d. Reject both the null and alternative hypotheses.

9. In a right-tailed test, if the critical value is greater than the computed value, then we _____.
   a. reject both the null and alternative hypotheses
   b.do not reject both the null and alternative hypotheses
   c. rejects the null hypothesis and support the alternative hypothesis
   d. fail to reject the null hypothesis and the alternative hypothesis not supported

10 .A drink vending machine is adjusted so that, on average, it dispenses 200ml of fruit juice with a standard deviation of 13ml into a plastic cup. However, the machine tends to go out of adjustment and periodic checks are made to determine the average amount of fruit juice being dispensed. The operator thinks that the amount dispensed is less than 200ml. So, to verify, a sample of 25 drinks is taken to test the adjustment of the machine and a mean of 195 is obtained. For $\alpha = 5\%$, an appropriate decision rule would be:
   a. rejecting the null hypothesis
   b. not rejecting the null hypothesis
   c. rejecting both the null and alternative hypotheses
   d. supporting both the null and alternative hypotheses

11. Find the critical value(s) of a two-tailed z-test with $\alpha = 0.05$.
    a. z = -1.64 b. z = ±0.06 c. z = 1.64 d. z = ±1.96

12. What should you do if the computed z-value lies in the critical region?
    a. Reject the null hypothesis.
    b. Do not reject the null hypothesis.
    c. Reject both the null and alternative hypotheses.
    d. Support both the null and alternative hypotheses.

13. The computed t-value is 1.9 and the critical value is 1.690. What conclusion can be drawn?
    a. Reject both the null and alternative hypotheses.
    b. Support both the null and alternative hypotheses.
    c. Support the null hypothesis and reject the alternative hypothesis.
    d. Reject the null hypothesis and support the alternative hypothesis.

For nos. 14-15, refer to the given statement:
In a right-tailed test with $\alpha = 0.01$, the z-computed value is 1.682.

14. What is the critical value?
    a.1.28 b. 1.645 c. 1.960 d. 2.326

15. What is your decision?
    a. Reject both the null and alternative hypotheses.
    b. Support both the null and alternative hypotheses.
    c. Reject the null hypothesis and support the alternative hypothesis.
    d. Do not reject the null hypothesis; hence the alternative hypothesis is unsupported.

Lesson 1 Drawing Conclusion About Population Mean Based on Test Statistic Value and Critical Region

The final step in testing hypothesis is to interpret the results or draw conclusions out of the computed value. In this module, you will decide whether you reject or not the null hypothesis.

Let us first recall the different terms related to hypothesis testing by answering the following activity.

What's In

Fact or Bluff?

Write FACT if the statement is true and BLUFF if not. Then, answer the guide questions that follow.

_____ 1. The notation μ and σ are sample values.

_____ 2. The alternative hypothesis is a statement that there is no significance difference between the two given properties.

_____ 3. In the given, $H_o: \mu = 21.5$ and $H_a: \mu > 21.5$ show a one-tailed test since it shows direction of the distribution.

_____ 4. The rejection region for a hypothesis test is also called the critical region.

_____ 5. The two types of significance test are one-tailed and two- tailed test.

_____ 6. The level of significance refers to the degree of significance in which we reject or fail to reject the null hypothesis.

_____ 7. We don't need to set the level of the significance because we can get 100% accuracy level in testing hypothesis.

_____ 8. A two-tailed test shows that the null hypothesis may be rejected when the test value is on the critical region on either side of the distribution.

_____ 9. Hypothesis testing is basically testing an assumption that we make about the population parameter.

_____ 10. In a two-tailed test, the null hypothesis should not be rejected when the test value is on either of the two critical regions.

Guide Questions:

1. Were you able to answer the questions correctly? If yes, you may proceed to the next question. If not, you may go back to the previous discussion so that you can recall the different terms related to hypothesis testing.

2. Why is test statistic important in hypothesis testing? Explain briefly.

3. After obtaining the computed value of your statistic, how will you interpret the result?

What's New

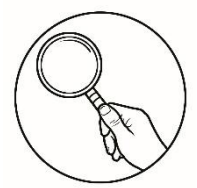
Which Is Greater?

Write the symbols greater than (>), less than (<), or equal to (=) in the following numbers. Then, answer the questions that follow.

1. 32.01_____ 32.10
2. 4.5 _____ 4.50
3. 1.25 _____ 1.241
4. - 3.3 _____ 3.3
5. 2.25 _____ 2.2
6. 1.894 _____ 1.98
7. - 2.26 _____ -2.3
8. -1.45 _____ 1.25
9. 1.87 _____ -1.87
10. 2.33 _____ 2.5

Were you able to write the correct symbols? If not, which part was confusing? Why do you think so?

You must know how to use these symbols in preparation for this lesson.



What is It

After obtaining the computed value of the test statistic, it is being compared to the critical values. You will use the following tables on z- and t- critical value.

Table 1: *z* – Critical Value

Type of Test	***Level of Significance***			
	α = 1%	***α = 2.5%***	***α = 5%***	***α = 10%***
one-tailed test	$c = \pm 2.326$	$c = \pm 1.960$	$c = \pm 1.645$	$c = \pm 1.28$
two-tailed test	$c = \pm 2.575$	$c = \pm 2.326$	$c = \pm 1.960$	$c = \pm 1.645$

Table 2: t – Critical Value

α for one-tailed test	***0.05***	***0.025***	***0.01***	***0.005***
α for two-tailed test	***0.10***	***0.05***	***0.025***	***0.01***
df = (n – 1)				
1	6.311	12.706	31.821	63.657
2	2.920	4.303	6.065	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.025	2.571	3.365	4.032
6	1.943	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921

17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845
21	1.721	2.080	2.512	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	1.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
31	1.695	2.040	2.453	2.744
32	1.694	2.037	2.449	2.738
33	1.692	2.035	2.445	2.733
34	1.691	2.032	2.441	2.728
35	1.690	2.030	2.438	2.724
36	1.688	2.028	2.434	2.719
37	1.687	2.026	2.431	2.715
38	1.686	2.024	2.429	2.712
39	1.685	2.023	2.426	2.708
40	1.684	2.021	2.423	2.704
42	1.682	2.018	2.418	2.698
44	1.680	2.015	2.414	2.692
46	1.679	2.013	2.410	2.687
48	1.677	2.011	2.407	2.682
50	1.676	2.009	2.403	2.678
60	1.671	2.000	2.390	2.660
Infinity	1.645	1.960	2.326	2.576

In general, if the absolute value of the computed value is ***greater than*** the absolute value of the critical value, we **reject the null hypothesis** and support the alternative hypothesis. But if the absolute value of the computed value is ***less than*** the absolute value of the critical value, we **do not reject or we fail to reject the null hypothesis** and the alternative hypothesis is not supported.

In a ***right-tailed test***, if the computed value is ***greater than*** the critical value, we **reject the null hypothesis** and support the alternative hypothesis. But if the computed value is ***less than*** the critical value, we **do not reject or we fail to reject the null hypothesis** and the alternative hypothesis is not supported.

In a ***left-tailed test***, if the computed value is ***less than*** the critical value, we **reject the null hypothesis** and support the alternative hypothesis. But if the computed value is ***greater than*** the critical value, we **do not reject or we fail to reject the null hypothesis** and the alternative hypothesis is not supported.

Rejecting the null hypothesis doesn't mean that it is incorrect, or the alternative hypothesis is correct. The collected data suggest a sufficient evidence to disprove the null hypothesis, hence we reject it.

Similarly, a failure to reject the null hypothesis does not mean that it is true -only that the test did not prove it to be false. There is an insufficient evidence to disprove the null hypothesis; hence we do not reject it.

Study the examples below.

Example 1: Compute for its value given the following information. Use $\alpha = 0.05$. Interpret the result.

$H_o: \mu = 70$ $\bar{x} = 71.5$ $\mu = 70$

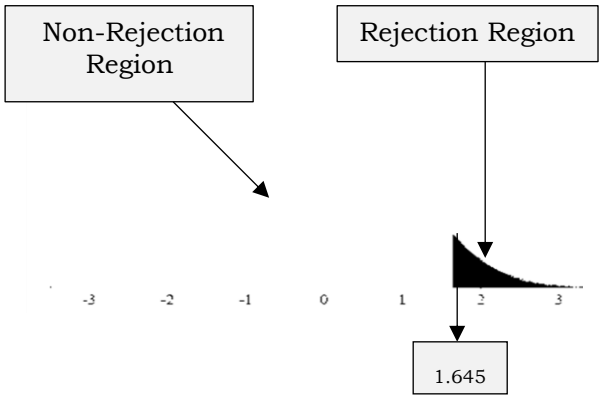
$H_a: \mu > 70$ $\sigma = 8$ $n = 100$

Solution: It is a one-tailed test, since it does mention about the direction of the distribution *(the alternative hypothesis uses the symbol >)*. Since σ is known and n ≥ 30, we will use *z*-test. The level of significance is 0.05. From Table 1, the *z*-critical value is 1.645. Thus, we have:

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \qquad z = \frac{1.5}{\frac{8}{10}}$$

$$z = \frac{71.5 - 70}{\frac{8}{\sqrt{100}}} \qquad z = \frac{1.5}{0.8}$$

$$\mathbf{z = 1.875}$$



Decision:

The computed z-value is 1.875 which is greater than the critical value of 1.645. Therefore, we reject the null hypothesis and support the alternative hypothesis.

Example 2: Compute for its value given the following information. Use $\alpha = 0.01$. Interpret the result.

$H_o: \mu = 127$ $\bar{x} = 124.5$ $\mu = 127$

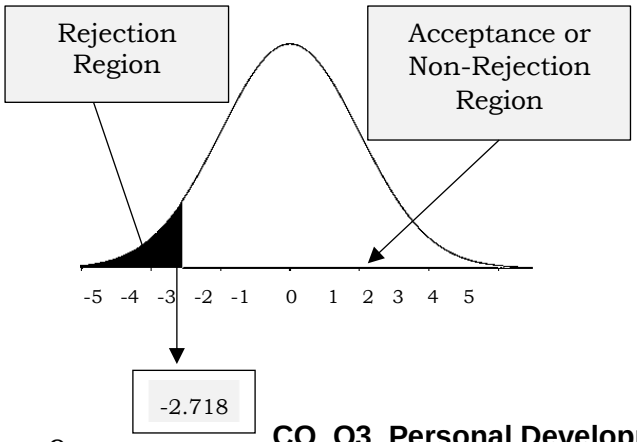
$H_a: \mu < 127$ $s = 5$ $n = 12$

Solution: It is a left-tailed test, since it does mention about the direction of the distribution *(the alternative hypothesis uses the symbol <)*. Since σ is unknown and n < 30, we will use t-test. The degree of freedom (*df = n - 1*) is 11 and $\alpha = 0.01$. Therefore, the t-critical value from Table 2 is -2.718. Thus, we have:

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \qquad t = \frac{-2.5}{\frac{5}{3.46}}$$

$$t = \frac{124.5 - 127}{\frac{5}{\sqrt{12}}} \qquad t = \frac{-2.5}{1.44}$$

$$\mathbf{t = -1.736}$$



Decision:

The computed t-value is greater than the t-critical value at $\alpha = 0.01$ (i. e.$-1.736 > -2.718$. *Since we have a left-tailed test, our conclusion is that we fail to reject the null hypothesis.*

Example 3: The government claims that P10,000 is the monthly expenses of a Filipino family with four members. A sample of 26 families has mean monthly expenses of P10,900 and a standard deviation of P1,250. Is there enough evidence to reject the government's claim at α = 2.5%?

Solution: Let us identify first the given. So, we have:

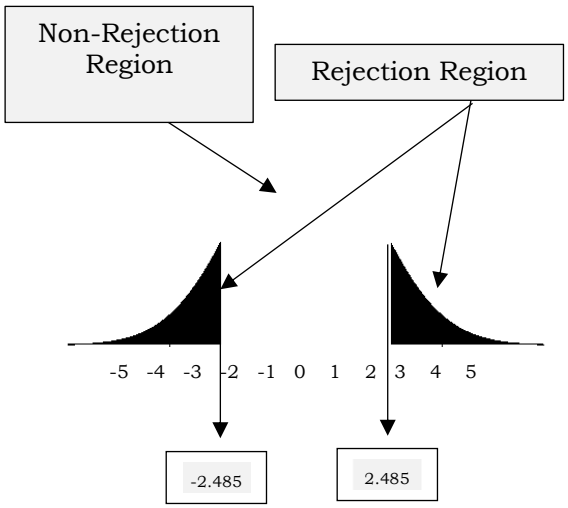
$H_o: \mu = P10{,}000$	$\bar{x}$ = P10,900	s = P1,250
$H_a: \mu \neq P\ 10{,}000$	μ = P10,000	n = 26

It is a two-tailed test, since it does not mention about the direction of the distribution. Since σ is unknown and n < 30, we will use t-test. The degree of freedom (*df = n - 1*) is 25 and α = 2.5%. Therefore, the t-critical value from Table 2 is **2.485**. Thus, we have:

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \qquad t = \frac{900}{\frac{1\,250}{5.10}}$$

$$t = \frac{10\,900 - 10\,000}{\frac{1\,250}{\sqrt{26}}} \qquad t = \frac{900}{245.10}$$

$$\mathbf{t = 3.671}$$



Decision:
The absolute value of the computed t-value is greater than the absolute of the critical t-value at $\alpha = 0.025$ (i.e. $|3.671| > |2.485|$*). Therefore, we reject the null hypothesis.*

Conclusion:
We can conclude that there is enough evidence to reject the claim of the government that P10,000 is the monthly expenses of a Filipino family with four members.

What's More

Activity 1: Rejected or Not Rejected?

Based on the given, decide whether the null hypothesis is rejected or not.

z- or t-computed value	z- or t-critical value
1. 2.310	1.960
2. 1.240	2.131
3. 2.960	2.896
4. 2.431	1.943
5. 1.523	1.721

Activity 2: Find Me

Complete the table below. Use Table 1: z-Critical Value and Table 2: t-Critical Value. The first item is done for you.

Type of Test	α	Sample Size	Computed Value	Critical Value	Decision
1. one-tailed	0.05	n = 17	2.015	1.746	Reject the null hypothesis.
2.	0.01	n ≥ 30	1.361	±2.575	
3. two-tailed	0.05	n = 27	3.026		
4. one-tailed	0.1		2.318	2.552	Do not reject the null hypothesis.
5. one-tailed		n ≥ 30	1.008	±1.960	

Activity 3: Am I Rejected or Not?

Color the emoticon RED if the null hypothesis is <u>not rejected</u> and BLUE if it is <u>rejected</u>. (Note: Use the table for the z- and t-critical values.)

	1. A one-tailed test with 5% level of significance has z-computed value of 1.120.
	2. The level of significance is 1% with z-computed value of 2.780 using two-tailed test.
	3. The z-computed value of a two-tailed test is -1.740 with 2.5% level of significance.

	4. The z-computed value is 2.037 with 0.05 level of significance of a one-tailed test.
	5. The t-computed value of a one-tailed test is 2.784 with 5% level of significance with 23 samples.
	6. A two-tailed test with 1% level of significance has t-computed value of 1.129 with sample size of 16.
	7. The level of significance is 5% with t-value of 1.458 using two-tailed test and n = 20.
	8. The computed value is -1.023 with 0.05 level of significance of a two-tailed test.
	9. The sample size is 11. The t-computed value of a one-tailed test is 2.374 with 5% level of significance.
	10. A one-tailed test with 1% level of significance has z-computed value of 2.455.

Activity 4: Interpret Me

Draw a conclusion from the given information.

1. $H_o: \mu = 80$ $H_a: \mu \neq 80$ The sample mean is 83, the sample size is 39, and the standard deviation is 5. Use α = 0.05.
2. $H_o: \mu = 7.5$ $H_a: \mu > 7.5$ The sample mean is 8.3 and the sample size is 52. The population follows a normal distribution with standard deviation of 3.17. Use α = 0.01.
3. $H_o: \mu = 10$ $H_a: \mu > 10$ The sample mean is 15, the sample standard deviation is 6.1, and the sample size is 9. Use α = 0.05.

4. $H_o: \mu = 116.12$ $H_a: \mu > 116.12$
The population follows a normal distribution with standard deviation of 7.18. The sample mean is 118.7 and the sample size is 21. Use α = 0. 01.

5. $H_o: \mu = 215$ $H_a: \mu \neq 215$
The population is approximately normal. The sample mean is 219.3, the sample standard deviation is 13.12, and the sample size is 22. Use α = 0.05.

What I Have Learned

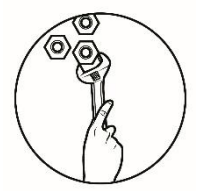
Fill in each blank with the correct word or phrase.

If the computed test statistic is in the critical region, then we (1)_____the null hypothesis.

In general, if the absolute value of the computed test statistic (i.e., z-value or t-value) is greater than the absolute value of the critical value, we (2)_____ the null hypothesis and support the alternative hypothesis. But if the absolute value of the computed test statistic is less than the absolute value of the critical value, we (3)_____ the null hypothesis and the alternative hypothesis is not supported.

In a right-tailed test, if the computed value is (4)_____ the critical value, we reject the null hypothesis and support the alternative hypothesis. But if the computed value (5)_____ the critical value, we fail to reject the null hypothesis and the alternative hypothesis is not supported.

In a left-tailed test, if the computed value is less than the critical value, we (6)_____the null hypothesis and support the alternative hypothesis. But if the computed value is greater than the critical value, we (7)_____ the null hypothesis and the alternative hypothesis is not supported.



What I Can Do

Answer the given problem.

The Guidance Counselor of your school claims that the Grade 11 students spend an average of 11.28 hours in a week doing performance tasks with standard deviation of 1.64. Your adviser thinks that students spend more time in doing performance tasks, so he decided to conduct his own research. He used a sample of 46 Grade 11 students and obtained a mean of 11.83. Is there enough evidence at 0.05 level of significance that the students spend 11.28 hours in a week doing performance tasks?

Assessment

Choose the best answer to the given questions or statements. Write the letter of your choice on a separate sheet of paper.

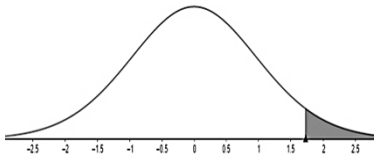
1. What is the critical value in a two-tailed test with 10% level of significance and a degree of freedom of 18?
   a. 2.575 b. 2.326 c. 1.960 d. 1.734

2. If the computed value is greater than the critical value, then we _____.
   a. retain the null hypothesis c. support the null hypothesis
   b. reject the null hypothesis d. fail to reject the null hypothesis

3. What does it mean when we failed to reject the null hypothesis?
   a.The null hypothesis is correct.
   b.The alternative hypothesis is incorrect.
   c.There is a sufficient evidence to support the null hypothesis.
   d. There is an insufficient evidence to disprove the null hypothesis.

4. If the t-computed value is 2.115 and the critical value is 2.423, what will be the decision?
   a. Reject the null hypothesis.
   b. Do not reject the null hypothesis.
   c. Reject both the null and alternative hypotheses.
   d. Support both the null and alternative hypotheses.

5. On the given figure below, the t-computed value is 1.217. What conclusion can be drawn?

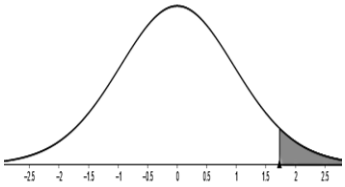


   a. Reject the null hypothesis.
   b. Fail to reject the null hypothesis.
   c. Reject both the null and alternative hypotheses.
   d. Support both the null and alternative hypotheses.

6. When we fail to reject the null hypothesis, which of the following statements is true?
   a. The conclusion is guaranteed.
   b. The conclusion is not guaranteed.
   c. There is a sufficient evidence to back up the claim.
   d. There is no sufficient evidence suggesting that the claim is false.

7. If the z-computed value is 1.253 and the critical value is 1.645, what will be the decision?
   a. Reject the null hypothesis.
   b. Do not reject the null hypothesis.
   c. Reject both the null and alternative hypotheses.
   d. Support both the null and alternative hypotheses.

8. On the given figure below, the z-computed value is 2.431. What conclusion can be drawn?



   a. Reject the null hypothesis.
   b. Fail to reject the null hypothesis.
   c. Reject both the null and alternative hypotheses.
   d. Support both the null and alternative hypotheses.

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9. In a right-tailed test, if the critical value is greater than the computed value, then we _____.
   a. reject the null hypothesis
   b. fail to reject the null hypothesis
   c. reject both the null and alternative hypotheses
   d. support both the null and alternative hypotheses

10. A drink vending machine is adjusted so that, on average, it dispenses 200ml of fruit juice with a standard deviation of 13ml into a plastic cup. However, the machine tends to go out of adjustment and periodic checks are made to determine the average amount of fruit juice being dispensed. The operator thinks that the amount dispensed is less than 200 ml. So to verify, a sample of 25 drinks is taken to test the adjustment of the machine and a mean of 195 is obtained. For α = 5%, an appropriate decision rule would be _____.
   a. retain the null hypothesis
   b. reject the null hypothesis
   c. support the null hypothesis
   d. fail to reject the null hypothesis

11. Find the critical value of a right-tailed z-test with α = 10%.
    a. z = 1.28 b. z = 1.645 c. z = 1.96 d. z = 2.326

12. What should you do if the computed t-value lies in the critical region?
    a. Reject the null hypothesis.
    b. Fail to reject the null hypothesis.
    c. Reject both the null and alternative hypotheses.
    d. Support both the null and alternative hypotheses.

13. The z-computed value is 2.113 and the critical value is 1.645. What conclusion can be drawn?
    a. Reject the null hypothesis.
    b. Fail to reject the null hypothesis.
    c. Reject both the null and alternative hypotheses.
    d. Support both the null and alternative hypotheses.

For nos. 14-5, refer to the given statement:
In a two-tailed test with $\alpha = 0.025$, the z-computed value is 2.014.

14. What are the critical values?
    a. ±2.575 b. ±2.326 c. ±1.960 d. ±1.645

15. What is your decision?
    a. Reject the null hypothesis.
    b. Do not reject the null hypothesis.
    c. Reject both the null and alternative hypotheses.
    d. Support both the null and alternative hypotheses.

Additional Activities

Directions: Answer the following.

1. When do you reject the null hypothesis?
2. What is your basis in rejecting the null hypothesis?
3. What conclusion can you derive if you reject the null hypothesis?
4. If you fail to reject the null hypothesis, does it mean that there is no enough evidence to back up the decision? Why?
5. Nowadays, people tend to buy products online. The shipping department manager claims that the average order shipped by their company is 1.89kgs. The general manager wants to verify if his claim is true. So, he randomly selects 25 sample of orders. What can the general manager conclude at 0.01 level of significance if the sample has a mean weight of 2.07kgs with a standard deviation of 0.72kg?

Answer Key

What I Know

1. A
2. B
3. D
4. C
5. A
6. D
7. B
8. B
9. D
10. A
11. D
12. A
13. D
14. D
15. D

What's In (FACT or BLUFF?)

1. BLUFF
2. BLUFF
3. FACT
4. FACT
5. FACT
6. FACT
7. BLUFF
8. FACT
9. FACT
10. BLUFF

What's New (Which Is Greater?)

1. <
2. =
3. >
4. <
5. >
6. <
7. >
8. <
9. >
10. <

What's More (Activity 1: Rejected or Failed to Reject?)

1. rejected
2. not rejected
3. rejected
4. rejected
5. not rejected

What's More(Activity 2: Find Me)

Type of Test	α	Sample Size	Computed Value	Critical Value	Decision
1. one-tailed	0.05	n = 17	2.015	1.746	Reject the null hypothesis.
2. Two-tailed	0.01	$n \geq 30$	1.361	±2.575	**Do not reject the null hypothesis**
3. two-tailed	0.05	n = 27	3.026	**2.056**	**Reject the null hypothesis**
4. one-tailed	0.1	n = 19	2.318	2.552	Do not reject the null hypothesis.
5. one-tailed	0.025	$n \geq 30$	1.008	±1.960	**Failed to reject the null hypothesis**

Additional Activities

1. If the absolute value of the computed value is *greater than* the absolute value of the critical value, we reject the null hypothesis.
2. In a right-tailed test, if the computed value is greater than the critical value, we reject the null hypothesis. In a left-tailed test, if the computed value is less than the critical value, we reject the null hypothesis.
3. Rejecting the null hypothesis doesn't mean that it is incorrect, or the alternative hypothesis is correct. The collected data suggest a sufficient evidence to disprove the null hypothesis, hence we reject it.
4. A failure to reject the null hypothesis does not mean that it is true - only that the test did not prove it to be false. There is an insufficient evidence to disprove the null hypothesis; hence we do not reject it.
5. Since the t – value (1.25) is less than the critical value (2.787), therefore, we can conclude that there is no enough evidence that the average order shipped by their company is 1.89kgs.

What I Have Learned

1. reject
2. reject
3. do not reject
4. greater than
5. less than
6. reject
7. do not reject

Assessment

1. D	9. B
2. B	10. B
3. D	11. A
4. B	12. A
5. B	13. A
6. D	14. B
7. B	15. B
8. A	

What I Can Do

Reject the null hypothesis. There is enough evidence at 0.05 level of significance that the students spend more than 11.28 hours in a week doing performance tasks.

What's More

(Activity 4: Interpret Me)

1. Reject the null hypothesis.
2. Fail to reject the null hypothesis.
3. Reject the null hypothesis.
4. Fail to reject the null hypothesis.
5. Fail to reject the null hypothesis.

What's More

(Activity 3: Am I Rejected or Not?)

1. Red	6. Red
2. Blue	7. Red
3. Red	8. Red
4. Blue	9. Blue
5. Blue	10. Blue

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Online Resources

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