SHS

AIRs - LM in

Statistics and Probability

Quarter 4: Week 3-Module 11

Forms of Test Statistic

Statistics and Probability
Grade 11 Quarter 4: Week 3 - Module 11: Forms of Test Statistic
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Development Team of the Module

Author: Alexander Randy C. Estrada, *TIII*

Editor: SDO La Union, Learning Resource Quality Assurance Team

Illustrator: Ernesto F. Ramos Jr., *P II*

Management Team:

Atty. Donato D. Balderas, Jr.
Schools Division Superintendent

Vivian Luz S. Pagatpatan, PHD
Assistant Schools Division Superintendent

German E. Flora, PHD, *CID Chief*

Virgilio C. Boado, PHD, *EPS in Charge of LRMS*

Erlinda M. Dela Peña, EDD, *EPS in Charge of Mathematics*

Michael Jason D. Morales, *PDO II*

Claire P. Toluyen, *Librarian II*

Target

It was stated in your past lesson that hypothesis testing is a decision-making process for evaluating claims about a population based on the characteristics of a sample purportedly coming from that population. The decision is whether the characteristic is acceptable or not.

This learning material will provide you with information and activities that will deepen your understanding about identifying the appropriate form of test statistics and the appropriate rejection region for a given level of significance.

After going through this module, you are expected to:

1. identifies the appropriate form of the test-statistics when: (a) the population variance is assumed to be known (b) the population variance is assumed to be unknown (c) the Central Limit Theorem is to be used. **(M11/12SP-IVb-2)**

2. identifies the appropriate rejection region for a given level of significance when: (a) the population variance is assumed to be known (b) the population variance is assumed to be unknown and (c) the Central Limit Theorem is to be used. **(M11/12SP-IVc-1)**

Subtasks:

1. determine the different forms of test statistic
2. illustrate the rejection region given the level of significance

Before going on, check how much you know about this topic. Answer the pretest on the next page in a separate sheet of paper.

Pretest

Directions: Choose the letter of the correct answer. Write your answer on a separate sheet of paper.

1. Which of the following terms makes a statement about a population for testing purpose?
   A. Hypothesis
   B. Level of significance
   C. Statistic
   D. Test-Statistics

2. Which is considered as the rejection probability of null hypothesis when it is true?
   A. Level of Confidence B. Level of Rejection
   C. Level of Margin D. Level of Significance

3. What test is used when the sample size is below 30 and the population standard deviation is unknown?
   A. Chi square test B. F-test C. t- test D. z-test

4. What is the assumption made for performing the hypothesis test with t-distribution?
   A. The distribution is non-symmetric
   B. The distribution has a constant variance
   C. The distribution follows a normal distribution
   D. The distribution has more than one modal class

5. Which test of hypothesis is being described when the critical value is evenly distributed?
   A. One-tailed B. Three-tailed
   C. Two-tailed D. Zero-tailed

6. Which word should be placed in the blank to make the statement correct "If a null hypothesis is accepted then the value of test statistic lies in the_____."?
   A. Acceptance region B. Critical region
   C. Rejection region D. Sample region

7. What type of statistical test for hypothesis concerning means is used when standard deviation is known?
   A. Chi square test B. p-test C. t-test D. z-test

8. How many samples are needed for the sample size to be considered as large?
   A. n>10 B. n>20 C. n>25 D. n>30

9. Which is the significance level if the level of confidence is 95%?
   A. $\alpha = .025$ B. $\alpha = .01$ C. $\alpha = .05$ D. 0.10

10. If the null hypothesis is false then which of the following is accepted?
    A Alternative Hypothesis B. Negative Hypothesis
    C. Null Hypothesis D. Positive Hypothesis

11. Which of the following illustrates confidence level?
    A. 10.5 B. 50.0 C. 50-55 D. 90%

12. What is the number of sample size that is considered enough for central limit theorem?
    A. 5 samples B. 10 samples C. 20 samples D. 30 samples

13. Which is the other term for non-directional test?
    A. One tailed test B. Two tailed test

C. Three tailed test D. Zero tailed test

14. Which of the following term should be placed in the blank to make the statement correct, "In central limit theorem the samples should be _____.?
A. Large enough B. Precise
C. Medium enough D. Small enough

15. What is the value of α when the confidence level 99%?
A. 0.01 B.0.05 C. 0.1 D. 0.5

Jumpstart

For you to understand the lesson well, do the following activities. Have fun and good luck!

Activity 1: Identify Me!

Directions: Identify the Appropriate Test Statistic to be used. Tell whether **t-test** or **z-test** will be used in the following:

1.	$\mu = 10$	$\sigma = 3$	$n = 68$	$\bar{x} = 9.2$
2.	$\mu = 7$	$s = 3$	$n = 10$	$\bar{x} = 5$
3.	$\mu = 9.1$	$s = 1.8$	$n = 15$	$\bar{x} = 7.2$
4.	$\mu = 52$	$\sigma = 7$	$n = 160$	$\bar{x} = 49.6$
5.	$\mu = 75$	$\sigma = 5.8$	$n = 118$	$\bar{x} = 72.2$

Activity 2. Is the test two tailed or one tailed?

Directions: Determine whether the test is two tailed or one tailed. If it is one tailed, specify whether it is a left tailed or right tailed.

1. Ho: $\mu = 25$
   Ha: $\mu \neq 25$

2. Ho: $\mu = 45$
   Ha: $\mu < 45$

3. Ho: $\mu = 35$
   Ha: $\mu > 35$

4. Ho: $\mu = 80$
   Ha: $\mu > 80$

$\mu = 78$ $s = 4$ $n = 10$ $\bar{x} = 78$

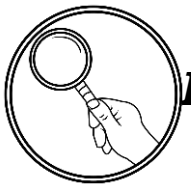
5. Ho: $\mu = 65$
   Ha: $\mu \neq 65$
   $\mu = 78$ $s = 3$ $n = 15$ $\bar{x} = 66$

Activity 3. Complete Me!

Directions: Complete the table showing the rejection regions for common values of α.

REJECTION REGIONS FOR COMMON VALUES OF α

	ALTERNATIVE HYPOTHESIS		
α	Left-tailed	Right Tailed	Two tailed
α =.10			$z<-1.645$ or $z>1.645$
α =.05		$z>1.645$	
α = .01	$z<-2.33$		



Discover

TEST STATISTIC

Test statistic is a statistic used in statistical hypothesis testing, provides a basis for testing a Null Hypothesis. A test statistic is random variable that is calculated from sample data and used in a hypothesis test. The sample statistic is use to either reject Ho (null hypothesis) or not to reject Ha (alternative hypothesis). There are two types of test statistic, we have z-test statistic and t-test statistic.

1. *z* - test

A ***z*-test** is a statistical test used to determine whether two population means are different when the variances are known, and the sample size is large. The test statistic is assumed to have a normal distribution and nuisance parameters such as standard deviation should be known for an accurate z-test to be performed. ***z*-tests** are used when we have large sample size ($n \geq 30$). Large enough for the Central Limit Theorem to apply. Below is the formula to be used in solving z-value where the population variance is assumed to be known.

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

where: z = z - test
$\bar{x}$ = sample mean
μ = population mean
σ = population standard deviation
n = sample size

2. t - test

A **t-test** is a calculation used to test a hypothesis, but they are useful when we need to determine if there is a statistically significant difference between two independent sample groups. Usually t-tests are most appropriate when dealing with problems with a limited sample size ($n<30$). t-tests are used when the sample size is below 30 and the population standard deviation is unknown.

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$$

where: t = t test
μ = population mean
$\bar{x}$ = sample mean
s = standard deviation of the sample
n = sample size

Let's consider below examples. Identify what test statistic to be used.

Example 1: Identify the appropriate test statistic given the information below:

$\mu = 50$ $\sigma = 7$ $n = 150$ $\bar{x} = 9.2$

Answer:

Since the population standard deviation is known, and n≥30, the appropriate test statistic is the ***z-test.***

Example 2: Given the following data: H_o: $\mu = 80$, H_a: $\mu \neq 80$, $n = 100$, $\sigma^2 = 8100$, $\bar{x} = 105$. Determine the test statistic.

Answer:

Since the population variance is known, and n≥30, the appropriate test statistic is the ***z-test.***

Example 3: The assistant principal of the Senior High School Department announced that the mean score of Grade 11 students in the first quarter examination in Statistics was 89 and the standard deviation was 12. One teacher who believed that the mean score was less than this, randomly selected 34 students and computed their mean score. She obtained a mean score of 85. At 0.01 level of significance, Determine the appropriate test statistic.

Answer:

*Since it is the population mean that is being tested, the population standard deviation is known, and n≥30, the appropriate test statistic is the **z-test** for a single mean.*

Example 4: Identify the appropriate test statistic given the information below:
$\mu = 11$ $s = 3$ $n = 12$ $\bar{x} = 14$
Answer:
*Since the population standard deviation is unknown, and n<30, the appropriate test statistic is the **t-test.***

Example 5: Given the following data: H_o: $\mu = 400$, H_a: $\mu \neq 400$, $\alpha = 0.01$, $n = 15$, $s = 21.5$, $\bar{x} = 390$. Determine the test statistic.
Answer:
*Since the population standard deviation is unknown, and n<30, the appropriate test statistic is the **t-test.***

Example 6: During the Covid-19 pandemic crisis local officials in the province announced that the average price of a kilogram of chicken in the province is ₱195.00. However, a sample of 15 prices randomly collected from different markets in the province showed an average of ₱200.00 and a standard deviation of ₱9.50. Using a 0.05 level of significance, is this sufficient evidence to conclude that the average price of chicken in the province is more than ₱195.00? Normality is assumed over the population. Select the test statistic.
Answer:
*Since it is the population mean that is being tested, the population standard deviation is unknown, and n<30, the appropriate test statistic is the **t-test.***

Example 7: Determine the test statistic to be used and identify whether the Central Limit Theorem is applicable or not given the following information:

a. H_o: $\mu = 250$ H_a: $\mu < 250$ $\alpha = 0.05$ $\sigma = 5$ $\mu = 11$ $n = 100$ $\bar{x} = 14$
Answer:
*Since n=100, the Central Limit Theorem is **applicable**, the distribution is normally distributed. The appropriate test statistic is the **z-test** statistic.*

b. Ho: $\mu=8$ Ha: $\mu\neq8$ $\alpha=0.05$ $\sigma=5$ $\mu = 11$ $n = 16$ $\bar{x} = 7.6$
Answer:
*Since n=16, the Central Limit Theorem **cannot be applied**. The appropriate test statistic is the **t-test** statistic.*

REJECTION REGION

A **rejection region** is the set of all values of the test statistic that cause us to reject the null hypothesis. It is also called as critical region. Below are the notes to remember about the rejection region.

** If the test statistic falls into the rejection region, we reject the null hypothesis in favor of the alternative hypothesis.*

** If the test statistic falls in the non-rejection region, we say that we do not have evidence to reject the null hypothesis.*

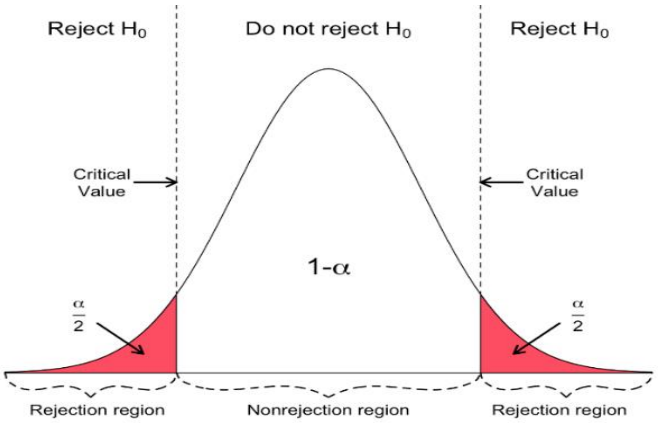
A **non-rejection region** is a set of values not in the rejection region that leads to non-rejection of the null hypothesis (Ho).

Considering the type of hypothesis test is also vital such as one-tailed test (left or right-tailed) and two-tailed test to determine the critical values to be used.

When do we use **two-tailed test**?

* If the sample mean can be lesser than or greater than the population mean the test is two tailed.
* If the alternative hypothesis contains the **inequality (≠)** symbol then the test is two- tailed.
* The test is two tailed if the probability (shaded region) is found on both tails of the distribution.

Illustration:

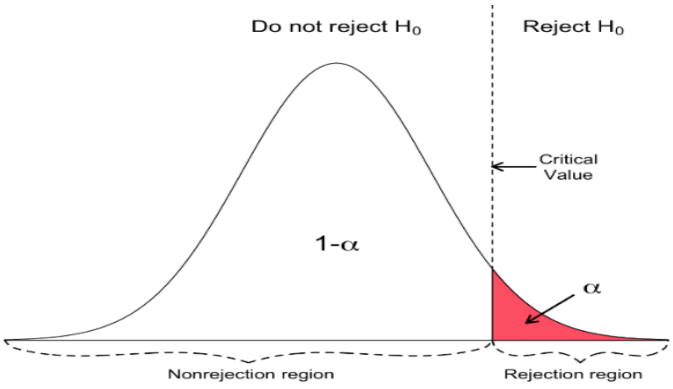


Since the two tailed test is non-directional, the rejection region is on **both sides of the curve**.

When do we use **right-tailed test**?

* If the hypothesis contains the greater **symbol (>),** then the rejection region is on the right tail of the curve.
* If the sample mean is greater than the population mean the test is one tailed, right tail.

Illustration:

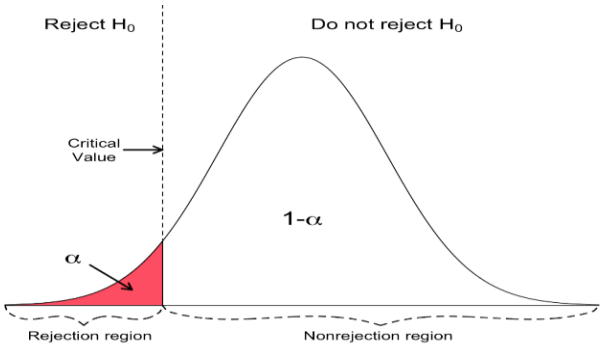


Since the test is right-tailed test and is directional, then the rejection region is on the **right tail of the distribution**

When do we use **left-tailed test**?

* If the hypothesis contains the less than symbol (<) then, the rejection region is on the left tail of the curve.
* If the sample mean is lesser than the population mean the test is one tailed, left tail.

Illustration:



Since the test is left-tailed test and is directional, then the rejection region is on the **left tail of the distribution**

As we can see in the three illustrations above, there are lines that separates the rejection and the non-rejection region. This line corresponds to a number called **critical values**. Critical values are very important in concluding whether the null hypothesis is to be rejected or not. The critical values could be determined using the *z*-table (*pls see the attach z-table after the references*), if n ≥ 30, large enough to apply the central limit theorem and the population is assumed to be known and t-table *(pls see the attach t-table after the references)* if n < 30, where central limit theorem cannot be applied and the population variance is assumed to be unknown.

Let's consider below examples:

Example 1: Identify the rejection region and the critical values when the test is two tailed, the level of significance is 0.05, the variance is known and n = 35?

Given: Two-tailed
Variance is known
α = 0.05
n = 35

Solution:

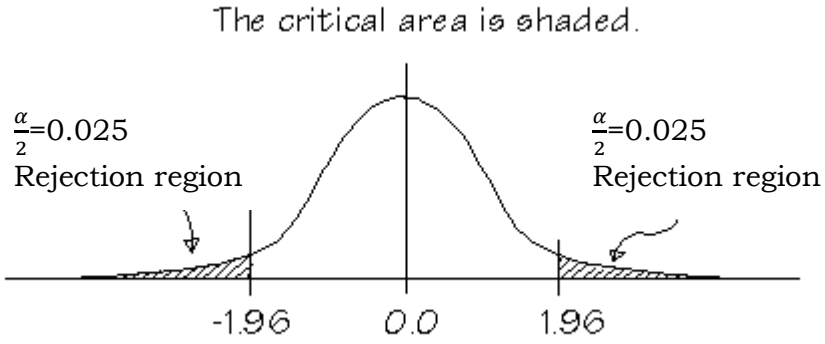
$\frac{\alpha}{2}$ = 0.025 Divide the level of significance (α) by 2

0.5 – 0.025 = 0.4750 Subtract the quotient from 0.5

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803

Use the *z*-table since n = 35 to find the critical values

Note: The area 0.4750 is under column headed 0.06. Move along this row to the left until 1.9 under column headed z is reached. Therefore, $Z_{\alpha/2} = 1.96$ at 5% level of significance, the critical values are ±1.96.



In the figure, the two tailed test with α = 0.05, the critical value for the rejection region cuts off $\frac{\alpha}{2}$ =0.025 or 2.5% in the two tails of the z distribution, so that $\mathbf{Z_{0.025} = \pm 1.96}$. **The null hypothesis (Ho) will be rejected if *z*>1.96 or *z*<-1.96.**

Example 2: Identify the rejection region and the critical values when the test is two tailed, the level of significance is 0.05, the variance is unknown and n = 20?

Given: Two-tailed

Variance is unknown

α = 0.05

n = 20

Solution:

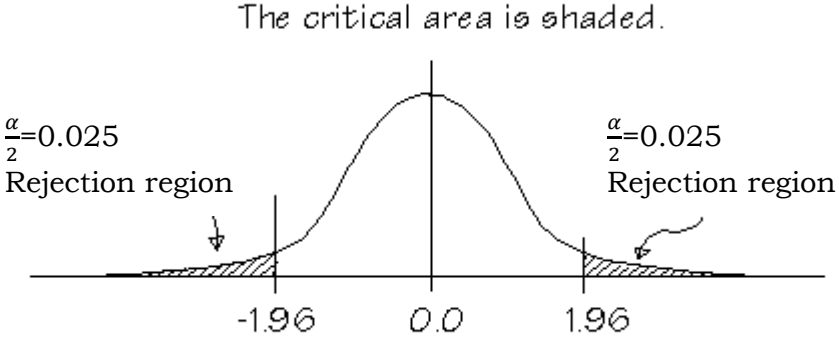
df = n -1 = 20-1 =19

Solve for the degrees of freedom using the formula n-1

one-tail	0.1	0.05	0.025	0.01	0.005
two-tails	0.2	0.1	0.05	0.02	0.01
DF					
18	1.33	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845

Use the t-table since the variance is unknown and n = 20 to find the critical values

*Note: In the table of critical values of t locate 19 in the first column headed df. Because the test is two tailed with a = 0.05, refer to the column indicating an area of 0.05 in two tails. The critical values are ± **2.093**.*



-2.093 2.093

The null hypothesis (Ho) will be rejected if t>2.093 or t<-2.093.

REJECTION REGIONS FOR COMMON VALUES OF α if n ≥ 30, variance is known and central limit theorem is used.

	ALTERNATIVE HYPOTHESIS		
α	Left-tailed	Right Tailed	Two tailed
α =.10	z<-1.28	z>1.28	z<-1.645 or z>1.645
α =.05	z<-1.645	z>1.645	z<-1.96 or z>1.96
α = .01	z<-2.33	z>2.33	z<-2.575 or z>2.575

Explore

Here are some enrichment activities for you to work on to master and strengthen the basic concepts you have learned from this lesson.

Activity 1: IDENTIFY ME!

Directions: Identify the appropriate test statistic to be used in the following:

1. μ = 8 s = 3 n = 12 $\bar{x}$ =6
2. μ = 9.3 s = 31.6 n = 15 $\bar{x}$ =7.4
3. μ = 12 s = 5.2 n = 10 $\bar{x}$ =8.8
4. μ = 400 σ = 92 n = 100 $\bar{x}$ =425
5. μ = 73 σ= 8 n = 200 $\bar{x}$ =78

Activity 2: FIND ME!

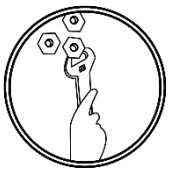
Directions: Find the critical value of the following.

1. A right tailed test; α=0.05; *df = 20*
2. A two tailed test; α=0.01; *df = 26*
3. A left tailed test; α=0.05; *df = 28*
4. A right tailed test; α=0.1; *df = 28*
5. A two tailed test; α=0.05; *df = 16*

Activity 3: DRAW MY REJECTION REGION
Directions: Find the appropriate rejection region in each case.

1. Ha: $\mu > \mu_0$; $\alpha = 0.05$
2. Ha: $\mu < \mu_0$; $\alpha = 0.05$
3. Ha: $\mu \neq \mu_0$; $\alpha = 0.05$
4. A right-tailed test at 10% level of significance.
5. A left -tailed test at 10% level of significance.

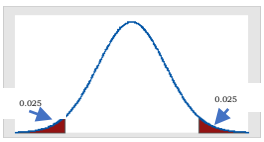
Great job! You have understood the lesson. Are you now ready to summarize?



Deepen

At this point, make an output by completing the table. Apply your knowledge about identifying the appropriate test statistic and identifying the appropriate rejection region. The scoring rubric will be used in assessing your outputs.

A) FILL ME OUT!
Directions: fill out the missing parts of the table. Some parts of the table are already fill out for your guidance.

Given Information	Test Statistic	2 tailed or 1tailed	Rejection Region (Right, Left or both left and right)	Draw the rejection region
Ho: $\mu=84$ Ha: $\mu\neq84$ $\bar{x} = 90$ $\sigma=12$ $n=32\alpha=0.01$	z-test		Both left and right	
Ho: $\mu=30$ Ha: $\mu>30$ $\bar{x} = 32$ $\sigma=5.5$ $n=34\alpha=0.05$		1 tailed		
Ho: $\mu=40$ Ha: $\mu<40$ $\bar{x} = 39$ $\sigma=8.5$ $n=42\alpha=0.05$			left	
Ho: $\mu=25$ Ha: $\mu\neq25$ $\bar{x} = 15$ $s=2.5$ $n=24\alpha=0.05$				
Ho: $\mu=45$ Ha: $\mu>45$ $\bar{x} = 35$ $s=2.5$ $n=26\alpha=0.05$				

Rubrics for Scoring the Output

Criteria	Exemplary 3	Accomplished 2	Developing 1	Beginning 0	Score
Identifies the appropriate Test Statistics and appropriate rejection region	Identifies correctly all appropriate test statistics and appropriate rejection region	Most but not all appropriate test statistic and rejection region identified.	Some appropriate test statistic and rejection region were identified correctly.	Incorrect or no test statistic and rejection region identified	
Completeness of answer	Addresses or answers all parts correctly	Addresses or answers most parts	Addresses or answers few parts	Does not answer any parts.	
Timeliness	The learner finished the task assigned before the time allotted.	The learner finished the task assigned just on time.	The learner finished 1 week late.	The learner finished more than 1 week late.	

Gauge

Directions: Read each item carefully. Write the letter of the correct answer. Use a separate sheet for your answers.

_____1. What test should be utilized if an economist wishes to determine whether there is evidence that average family income in a community exceeds P15,000?

A. A two-tail test should be utilized

B. A one-tail test should be utilized to the left.

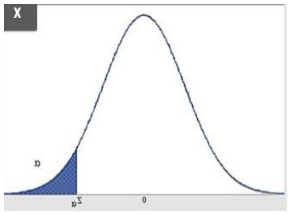
C. A one tail test should be utilized to the right

D. Either one tail or two-tai test could be used with equivalent results.

_____2. A teacher wants to know how well his students perform in his Statistics class relative to students in other Statistics classes in the school. He administers a standardized test which students in other classes had taken with a mean of 65 and standard deviation of 10. His class has 50 students. Which statistical method should he use?

A. t-test B. z-test C. Both t and z test D. None of these

_____3. Which of the following gives the correct description for the figure below?

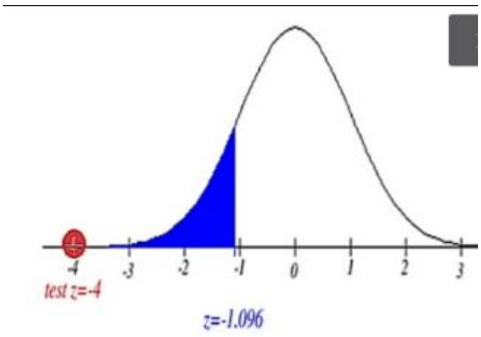


A. Left-tailed; Reject Ho if $z \leq z_{\alpha}$
B. Right-tailed; Reject Ho if $z \geq z_{\alpha}$
C. Two tailed: Reject Ho $z \geq z_{\alpha/2}$
D. None of these

_____4. Which of the following terms should be be used to complete the statement, "In a two- sample test of means for independent samples, the equal sign always appears in the _____."?

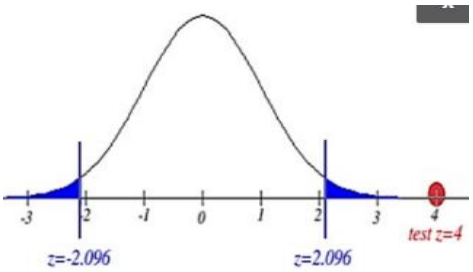
A. Alternate hypothesis
B. Left tail of the test statistic
C. Null hypothesis
D. Right tail of the test statistic

_____5. The figure below shows a normal curve with its rejection region shaded. The dot shows the calculated test statistic. Is the test one tailed or two tailed?



A. The test is one-tailed, left tail
B. The test has no tail
C. The test is one-tailed, right tail
D. The test is two tailed

_____6. The figure below shows a normal curve with its rejection region shaded. The dot shows the calculated test statistic. Should the null hypothesis be rejected or accepted?



A. The null hypothesis must be accepted because the test statistic is within the rejection region.
B. The null hypothesis must be rejected because the test statistic is within the rejection region.
C. The null hypothesis must be rejected because the test statistic is not within the rejection region.
D. The null hypothesis must be accepted because the test statistic is not within the rejection region.

_____7. Consider a hypothesis Ho where $\mu o=23$ against $\mu a<23$. The test is?
A. Right tailed B. Centered tailed
C. Left tailed D. Non directional

_____8. Consider a hypothesis Ho where $\mu o = 5$ against $\mu a > 5$.The test is?
A. Right tailed B. Centered tailed
C. Left tailed D. Non directional

_____9. Which test statistic should be used using the given information below?
Ho: $\mu = 350$
Ha: $\mu > 350$
$\sigma = 77$ $n = 60$ $\bar{x} = 380$
A. p-test B. t- test C. v-test D. z-test

_____10. What is the significance level if the level of confidence is 99%?
A. 0.1 B. 0.01 C. 0.05 D. 0.5

_____11. Which test statistic to be used given $\mu = 10$, $s = 5.1$, $n = 10$, $\bar{x} = 7.8$?
B. p-test B. t- test C. v-test D. z-test

_____12. Suppose that the z is the test statistic for hypothesis testing, calculate the value of z for $\mu = 100$ $\sigma = 12$ $n = 130$ $\bar{x} = 92$
A.-6.72 B.6.72 C. 7.62 D. -7.62

_____13. Identify the appropriate rejection region: A teacher claims that his students scored an average of 90 in their Statistics exam. The principal wants to know whether the teacher's claim is acceptable or not.
A. The rejection region is located at the right tail of the distribution curve.
B. The rejection regions are located at both tail of the distribution curve.
C. The rejection region is located at the left tail of the distribution curve.
D. None of the above.

_____14. A wine manufacturer claims that the average selling price of all the manufactured wine cost only 250 pesos. A buyer wants to test whether the mean selling price if all the wine manufactured exceed 250 pesos. Which is the appropriate rejection region?

A. The rejection region is located at the right tail of the distribution curve.
B. The rejection regions are located at both tail of the distribution curve.
C. The rejection region is located at the left tail of the distribution curve.
D. None of the above.

_____15. Which test statistics should be used given the following information?

$\mu = 26$ $\sigma = 4.5$ $n = 80$ $\bar{x} = 28.3$

A. p-test B. t- test C. v-test D. z-test

References

Printed Materials:

Belecina, E. B. (2016). Statistics and Probability (pp 216-232). Sampaloc, Manila: Rex Printing Company, INC.

Website:

https://www.statology.org/

https://www.chegg.com/homework-help

PERCDC learnhub quexbook.com

t-table

	P						
one-tail	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	0.2	0.1	0.05	0.02	0.01	0.002	0.001
DF							
1	3.078	6.314	12.706	31.821	63.656	318.289	636.578
2	1.886	2.92	4.303	6.965	9.925	22.328	31.6
3	1.638	2.353	3.182	4.541	5.841	10.214	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.61
5	1.476	2.015	2.571	3.365	4.032	5.894	6.869
6	1.44	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.86	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.25	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.93	4.318
13	1.35	1.771	2.16	2.65	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.14
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.12	2.583	2.921	3.686	4.015
17	1.333	1.74	2.11	2.567	2.898	3.646	3.965
18	1.33	1.734	2.101	2.552	2.878	3.61	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.85
21	1.323	1.721	2.08	2.518	2.831	3.527	3.819

z-table

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999