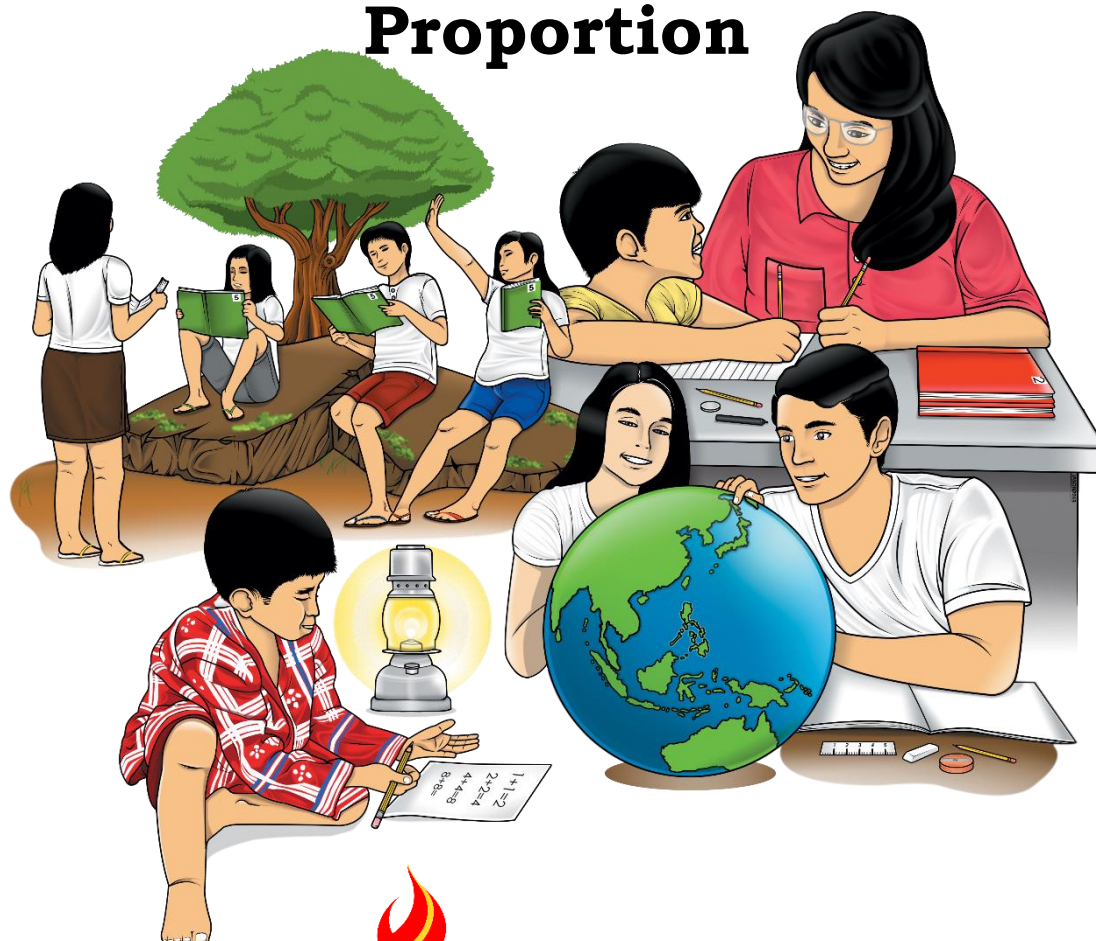


Statistics and Probability

Quarter 4 – Module 10: Identifying Appropriate Test Statistic Involving Population Proportion



Statistics and Probability – Grade 11
Alternative Delivery Mode
Quarter 4 – Module 10: Identifying Appropriate Test Statistic Involving Population Proportion
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Statistics and Probability

Quarter 4 – Module 10: Identifying Appropriate Test Statistic Involving Population Proportion

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.



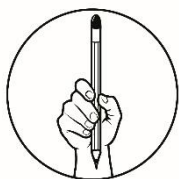
What I Need to Know

As you may recall, the Central Limit Theorem tells that if the sample size is sufficiently large, then the mean of the random sample from a population has a sampling distribution that is approximately normal, even when the original population is not normally distributed. This means that regardless of the shape of the original distribution, the sampling distribution of the mean approaches a normal distribution as long as the sample is large enough. Remember that the Central Limit Theorem is not limited to sample means only. It can also be applied to sample proportions.

This module deals on identifying the appropriate form of test statistics involving population proportion when the Central Limit Theorem is to be used. However, the activities are limited to estimating the population proportion and sample proportion as preparation in solving for the appropriate test statistics.

After going through this module, you are expected to:

1. define population proportion and sample proportion;
2. determine the value of the population proportion and sample proportion;
3. identify the appropriate form of the test statistic when the Central Limit Theorem is to be used; and
4. relate population proportion in real-life situations.



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. It is a part of the population with a particular trait expressed in decimal, percent, or fraction.
 - a. Sample
 - b. Population
 - c. Sample Proportion
 - d. Population Proportion
2. It is the symbol used to represent the proportion of the samples.
 - a. x
 - b. p
 - c. $\hat{p}$
 - d. n
3. What is the sample proportion if $n = 550$ and $x = 308$?
 - a. 0.35
 - b. 0.50
 - c. 0.56
 - d. 0.65
4. A researcher claims that 4% of all helmets have manufacturing flaws that could potentially cause injury to a motorcycle wearer. A sample of 100 helmets revealed that 5 contain such defects. Is the sample large enough to use the Central Limit Theorem?
 - a. No, because $5/100 \leq 5$
 - b. No, because $100(0.04) \leq 5$
 - c. Yes, because $100 \geq 30$
 - d. Yes, because $100(0.96) \geq 5$
5. In testing hypothesis involving population proportion, when do we say that the sample size (n) is sufficiently large?
 - a. if $n \geq 30$
 - b. B. if $n < 100$
 - c. if $np \geq 5$, $nq \geq 5$
 - d. if $n/p \leq 5$, $n/q \leq 5$
6. What is the part of the proportion of individuals in a sample sharing a certain trait?
 - a. sample
 - b. population
 - c. sample proportion
 - d. population proportion
7. Twenty-eight percent (28%) of all Masagana High School students believe that Monday will be a rainy day. You take a sample of 50 students and find that 15 of them believe Monday will be a rainy day. What does 50 represent?
 - a. x
 - b. p
 - c. $\hat{p}$
 - d. n

8. What would be the sample in the following situation?
 A restaurant wants to know if customers buy dessert when they eat out. As people leave the restaurant one evening, 20 people are randomly surveyed. Eight people say they usually order dessert when they eat out. The restaurant concludes that most customers do not order dessert.
- 8 customers
 - 20 customers
 - all customers
 - all customers who do not order dessert
9. Which assumption/s must be considered in testing hypothesis involving proportion?
- The conditions for binomial experiment are met.
 - The expression $np > 5$ and $nq > 5$ are both satisfied.
 - The sample size must be greater than or equal to 30.
- I and II
 - I and III
 - II and III
 - III only
10. What would be the population in this situation?
 Surveyors in a mall choose shoppers to ask about products they prefer.
- the surveyors
 - the products they sell
 - all shoppers in the mall
 - the shoppers who were asked about their preferences
11. In testing hypothesis involving population proportion, which of the following is appropriate to use?
- t-test
 - z-test
 - p-test
 - chi square
12. If the value of p is 0.45, what is the value of q ?
- 0.45
 - 0.46
 - 0.54
 - 0.55
13. Before the Mayweather vs. Pacquiao's Fight of the Century, 75% of people in Manila said that they prefer boxing over basketball. After the fight, out of 150 randomly chosen people in Manila, 105 said they prefer boxing over basketball. Which statement represents the probability of failure, q ?
- They prefer boxing over basketball.
 - They prefer basketball over boxing.
 - They don't prefer boxing over basketball.
 - They don't prefer both boxing and basketball.
14. In problem no. 13, what is the value of the sample proportion, $\hat{p}$?
- 0.60
 - 0.67
 - 0.70
 - 0.75

15. In a learning study, 1,200 respondents were asked if they can assimilate concepts while watching television wherein 586 said YES. What is the proportion of those who said yes?
- a. 0.40 b. 0.49 c. 0.51 d. 0.58

How did you find this pre-test? Did you encounter both familiar and unfamiliar terms? Kindly compare your answers in the Answer Key on the last part of this module.

If you got a perfect score or 100%, skip this module and proceed to the next one. But if you missed even a single point, please continue with this module as it will enrich your knowledge in hypothesis testing involving population proportion.

Lesson 1

Identifying Appropriate Test Statistic Involving Population Proportion

There are certain situations when the data to be analyzed involve population proportion or percentage. The following are some of examples that show this condition.

- A politician wants to know the *percentage* of his constituents who approve of his policy on educational programs and reforms.
- A manufacturing company is interested on determining the *proportions* of defective products in the assembly line.
- A set of randomly selected employees were asked to determine the *percentage* of their incomes spent on food per month.
- In a sample of 50 students, there are 15 part-timers. (This situation shows proportion.)
- Fifty percent (50%) of the restaurants in the sample generate more than a third of their weekly sales of juices.

It is noticeable that the cases above used percentage of the population. In the previous modules, you have learned how to test hypothesis concerning population mean and sample mean. This time, you will learn how to test hypothesis involving population proportion. To be able to do so, the z-test statistics for population proportion will be applied particularly when the Central Limit Theorem is to be used. However, as mentioned before, this lesson will just serve as a preparation. Further details on computing for the test statistics involving proportion will be discussed on Module 12.

Go over the lessons and have fun in working with the activities.



What's In

It is important that you get yourselves be acquainted to different terms that you will encounter throughout this module. The activity below will help you to check your understanding and be familiarized about these terms.

Please observe honesty and perseverance at all times.

Activity 1: Remind Me Please...

Identify the word/s being described by the statements in the box. Copy the letters of your answer on the corresponding columns on the table below. Then, answer the questions that follow.

A - Sample
R - Population

E - Sample Proportion
T - Population Proportion

1. It is an entire group of people, objects, or events which all have at least one characteristic in common and must be defined specifically and unambiguously.
2. It refers to any part of a population regardless of whether it is a representative or not.
3. It refers to a part of a population with a particular attribute, expressed as a fraction, decimal, or percentage of the whole population.
4. It is the proportion of individuals in a sample sharing a certain trait.

1	2	3	4

Answer the following questions. Write your answer on a separate sheet of paper.

1. Find a word that begins with **p** and is synonymous to your answer in the table above.
2. **Which One Doesn't Belong?** Identify the group of words that are most likely **NOT** synonymous to *proportion*.

A. Ratio
Fraction
Percentage

C. Mean
Average
Calculation

B. Part
Section
Calculation

D. Rate
Percentage
Measureme



What's New

Now to start this lesson, accomplish the activity below. Do not forget to keep your answers because we will be using them in our discussions.

Activity 2: Rainbow Connection

In Matapat City, 10% of the residents are senior citizen. A survey was conducted to 500 randomly selected senior citizen residents to determine if they have cell phones. Out of 500 respondents, 421 answered that they own a cell phone.

Based on the situation above, match the questions in Column A to their corresponding answers in Column B. Copy and use colored pens in connecting the dots.

Column A		Column B
1. What is the survey all about?	•	• 500 senior citizen residents
2. What percent of the residents in the city are senior citizens?	•	• 421 senior citizen residents
3. How many senior citizen residents are actually surveyed?	•	• residents in the city
4. How many senior citizen residents own a cell phone?	•	• senior citizen residents in the city
5. What variable describes the population in the situation?	•	• senior citizen residents who own a cell phone
6. What variable serves as the sample?	•	• 10 % of the residents
		• 84.2% senior citizen residents

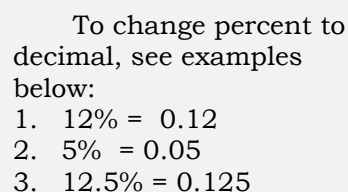


Population Proportion and Sample Proportion

p = _____ %

$$\begin{aligned}\hat{p} &= \frac{\text{no. of senior citizen residents with cell phone}}{\text{no. of senior citizen residents}} \\ \hat{p} &= \frac{421}{500} \\ \hat{p} &= 0.84\end{aligned}$$

- “20% of the respondents” = 0.20
- “5% of the defective bulbs” = 0.05
- “50% of the Grade 12 students” = 0.50



On the other hand, there are cases where we still need to calculate $\hat{p}$. Examples of these kinds are:

- “70 out of 200 residents are married.”
- “150 out of 500 listeners are interviewed.”
- “10 out of 1000 bulbs are defective.”

In this case, we need to solve for the value of the **sample proportion $\hat{p}$** (read as “**p hat**”).

Sample proportion ($\hat{p}$) is the ratio of the number of elements in the sample possessing the characteristics of interest over the number of elements in the sample or n . It is computed by the formula:

$$\hat{p} = \frac{\text{random variable for the number of successes in } n \text{ samples}}{\text{number of trials or the size of the sample}} = \frac{x}{n}$$

$$\hat{p} = \frac{x}{n}$$

where: $\hat{p}$ is the proportion of the number of successes in n samples and read as “p hat”.
 x represents the number of “successes” in n samples; and
 n represents the size of the sample.

The example below will help you understand better how we can easily estimate the value of the sample proportion.



Remember that in a situation describing a population proportion/sample proportion, the words “mean” or “average” are not used.

Illustrative Example:

For a class project, a Grade 12 STEM student wants to estimate the percentage of students in his school who are registered voters. From 45% of Grade 12 students, he surveys 500 students and finds that 200 are registered voters. Determine the value of p and compute for the sample proportion.

Solution:

The population proportion is the rate or percent used from the entire Grade 12 students. Therefore:

Population Proportion, $p = 45\% = 0.45$

To find the sample proportion ($\hat{p}$), identify the ff:

Surveyed Grade 12 students = $n = 500$

Registered Grade 12 students = $x = 200$

Therefore, the sample proportion will be computed as follows:

$$\begin{aligned}\text{Sample Proportion, } \hat{p} &= \frac{\text{number of registered Grade 12 students}}{\text{number of Grade 12 students}} \\ \hat{p} &= \frac{200}{500} \\ \hat{p} &= 0.4\end{aligned}$$

Using the Central Limit Theorem in Testing Population Proportion

When testing situations involving proportion, a percentage, or a probability, the following assumptions must be considered:

1. The conditions for binomial experiment are met. That is, there is a fixed number of independent trials with constant probabilities and each trial has two outcomes that we usually classify as “**success**” (**p**) and “**failure**” (**q**). The sum of **p** and **q** is **1**. Hence, we can write **p + q = 1** or **q = 1 - p**.
2. The conditions **np ≥ 5** and **nq ≥ 5** are both satisfied so that the binomial distribution of sample proportion can be approximated by a normal distribution with $\mu = np$ and $\sigma = \sqrt{npq}$. (However, the specific number varies from source to source, some authors use 10 instead of 5 depending on how good an approximation one wants.)

Likewise, the second assumption served as the basis to determine whether the sample size from the population proportion is sufficiently large or not. Remember that this time, the condition that sample be large is not **n** to be at “least 30” but it should satisfy the second assumption. For a large size of sample proportions, the Central Limit Theorem (CLT) can be used. Bear in mind that if the sample size is sufficiently large, then the mean of the random sample from a population has a sampling distribution that is approximately normal, even when the original distribution is normally distributed and $n \geq 30$.

Now, let us check the assumptions from the previous situation:

1. It is evident that the responses have only two outcomes: “registered voter” (success) or “not registered voter” (failure). Therefore, the first assumption is met.
2. To be able to satisfy the second condition, we find the hypothesized value of the population proportion **p = 0.45** while **n = 500**. To get **q**, **q = 1 - p** which makes **q = 1 - 0.45 = 0.55**.

Through substitution, it shows that the second assumption is also met, since:

$$\begin{array}{ccc} np \geq 5 & \text{and} & nq \geq 5 \\ 500 (0.45) \geq 5 & \text{and} & 500 (0.55) \geq 5 \\ 225 \geq 5 & \text{and} & 275 \geq 5 \end{array}$$

Since we have shown that $np \geq 5$ and $nq \geq 5$, all conditions are met where the sample size is truly large enough to use CLT. In this condition, the test statistic to be used is the *z-test statistic* for proportions denoted by **Z_{com}** or **the computed z-value**.

The z-Test Statistic for Population Proportion

Recall the z-score formula to be $z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$

With $np \geq 5$ and $nq \geq 5$ and with the

standard deviation of sample proportion be $\sqrt{\frac{pq}{n}}$

Substituting $\hat{p}$ for $\bar{x}$

and $\sqrt{\frac{pq}{n}}$ for $\sigma_{\bar{x}}$

Therefore, the formula for the value of *z-test statistic for population proportion* would be:

$$Z_{\text{com}} = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} \quad \text{or} \quad Z_{\text{com}} = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

where:

Z_{com} is the z-test statistic for proportion.

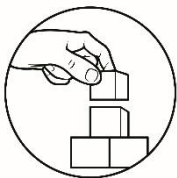
$\hat{p}$ is the sample proportion ($\frac{x}{n}$).

p is the hypothesized value of the population proportion.

n is the sample size or the number of observations in the sample.

q is equal to $1 - p$.

Remember this formula because you are going to use this in Module 12 where the actual computation for the test statistic involving population proportion will be held.



What's More

Activity 3: I Can

In each item, complete the set of solutions.

- The iCare Center for Internet & Society at Kaliwanagan Province recently conducted a study analyzing the privacy management habits of 80% teen internet users. In a group of 50 teens, 13 are reported to have more than 500 friends on Facebook. Determine the value of p and sample proportion $\hat{p}$.

Solution:

$$p = \underline{\hspace{1cm}} \%$$

$$= \underline{\hspace{1cm}}$$

$$\hat{p} = \frac{x}{n}$$

$$\hat{p} = \underline{\hspace{1cm}}$$

$$\hat{p} = \underline{\hspace{1cm}}$$

2. A student polls his school to see if students in Matapat Integrated High School are pro or against the new legislation regarding the prohibition of the use of cell phones in classroom. From 65% of the students in the school, she surveys 600 students and finds that 480 are against the new legislation. Determine the value of p and the sample proportion $\hat{p}$.

Solution:

$$\begin{array}{l} p = \underline{\hspace{1cm}} \% \\ = \underline{\hspace{1cm}} \end{array}$$

$$\begin{array}{l} \hat{p} = \frac{x}{n} \\ \hat{p} = \underline{\hspace{1cm}} \\ \hat{p} = \underline{\hspace{1cm}} \end{array}$$

3. A survey of 2500 women between the ages of 15 and 50 in Kalinisan City found that 28% of those surveyed relied on the pill for birth control. The research shows that 25% of the population are using the pill for birth control. Determine the value of p and the sample proportion $\hat{p}$.

Solution:

$$\begin{array}{l} p = \underline{\hspace{1cm}} \% \\ = \underline{\hspace{1cm}} \end{array}$$

$$\begin{array}{l} \hat{p} = \frac{x}{n} \\ \hat{p} = \underline{\hspace{1cm}} \\ \hat{p} = \underline{\hspace{1cm}} \end{array}$$

4. A poll taken prior to election day finds that 45% of registered voters intend to vote for Mayumi Caliwagan as barangay chairperson of Brgy. Kapatagan. A concerned citizen surveyed that 380 out of 700 registered voters favored for Mayumi. Determine the value of p and the sample proportion $\hat{p}$.

Solution:

$$\begin{array}{l} p = \underline{\hspace{1cm}} \% \\ = \underline{\hspace{1cm}} \end{array}$$

$$\begin{array}{l} \hat{p} = \frac{x}{n} \\ \hat{p} = \underline{\hspace{1cm}} \\ \hat{p} = \underline{\hspace{1cm}} \end{array}$$

5. A survey to the pet owners in Green Village is taken and 40% of those surveyed say they have dogs as their pet for protection for self/family. A group of 180 pet owners are interviewed and 100 said that they have dogs for protection of self/family. Determine the value of p and the sample proportion $\hat{p}$.

Solution:

$$\begin{array}{l} p = \underline{\hspace{1cm}} \% \\ = \underline{\hspace{1cm}} \end{array}$$

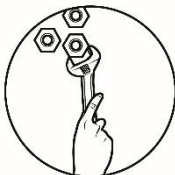
$$\begin{array}{l} \hat{p} = \frac{x}{n} \\ \hat{p} = \underline{\hspace{1cm}} \\ \hat{p} = \underline{\hspace{1cm}} \end{array}$$



What I Have Learned

Copy and complete the statements below.

1. A part of the population with a particular attribute or trait expressed as a fraction, decimal, or percentage of the whole population is known as _____ of which in symbol is _____.
2. A part of the sample or the proportion of individuals in a sample sharing a certain trait is known as _____ and is written in symbol as _____.
3. To be able to find $\hat{p}$, divide the number of _____ in the samples by the number of _____ or _____ of the samples.
4. The symbol _____ represents the successes of the samples.
5. The size of the sample is symbolized as _____.
6. The test statistic used in testing hypothesis involving population proportion is _____ whose formula is _____.
7. CLT means _____.
8. The two assumptions in testing the situations involving population proportion is to show that conditions for _____ are met;
9. and _____ are both satisfied.
10. Sample size is considered to be sufficiently large if _____.



What I Can Do

Activity 4.1: Fast Break

Given the following, compute for the value of the sample proportion $\hat{p}$ in as fast as you can. (Answers in nearest hundredths)

	Number of Successes, (x)	Number of Samples, (n)	Value of Sample Proportion, ($\hat{p}$)
1	520	850	
2	168	480	
3	248	620	
4	150	540	
5	425	930	

Activity 4.2. Puzzle

Identify the statements describe below. Write your answer in the puzzle box. Copy the box.

POPPOP Puzzle

Across:

1. Sample _____
3. Symbolized as q
4. Opposite of 'Failure'
6. Central _____ Theorem

Down:

1. _____ Proportion
2. An experiment with 2 outcomes only
5. Same as percentage
7. It is symbolized as n
8. Test statistic for population proportion
9. The symbol $\hat{p}$ is read as ____

			8									
								2				
	1											
												9
4												
										7		
3					5							
								6				

Activity 4.3. On My Own

Check whether the sample is in each problem is sufficiently large enough to use the Central Limit Theorem in normal approximation.

1. A Public Information Survey investigated whether the majority of 40% of adults supported a tax increase to help fund the local school system. Out of this, a random sample of 300 showed that 113 agreed with the tax increase.
2. It is believed that in the coming election, 65% of the voters in the Province of Kaunlaran will vote for the administrative candidate for governor. Out of

- 1,170 randomly selected voters, 640 indicated that they would vote for the administrative candidate.
3. Suppose that in the past, 42% of all adults favored capital punishment. Do we have reason to believe that this proportion has increased if in a random sample of 150 adults, 80 favored capital punishment?
 4. Professors from an organization for private colleges and universities reported that more than 6% of professors attended a national convention in the past year. To test this claim, a researcher surveyed 80 professors and found that 5 attended a national convention in the past year.
 5. An insurance industry report indicated that 30% of those persons involved in minor traffic accidents this year have been involved in at least one traffic accident in the last five years. Believing it was too large, an advisory group decided to investigate this claim. A sample of 200 traffic accidents this year showed that 56 persons were also involved in another accident in the last five years.
 6. A researcher claims that 75% of college students would rather spend their extra money for internet access loads than food. Another researcher would like to verify this claim. She randomly selected 400 students. Among them, 296 said that they would rather use their extra money for internet access loads than food.
 7. Malakas made a claim that 95% of college male students in their school join triathlon. His friend, Baste, finds this hard to believe and decided to check the validity of such claim, so he took a random sample and found out that 75 out of 90 had joined the race.
 8. A politician claims that he will receive 60% of the votes in the upcoming election. In a random sample of 500 voters, there are 175 who will surely vote for him.
 9. A social worker reports that 4% of workers in a factory are below 21 years of age. Of the 120 employees surveyed, 8 said they are below 21 years old.
 10. A certified public accountant (CPA) claims that more than 25% of all accountants advertise. A sample of 112 accountants in Metro Manila showed that 40 use some form of advertising.



Assessment

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

- It is a part of the sample with a particular trait expressed in decimal, percent, or fraction.
 - sample
 - population
 - sample proportion
 - population proportion
- It is the symbol used to represent the size of the samples.
 - n
 - $\hat{p}$
 - p
 - x
- What is the sample proportion if $n = 740$ and $x = 259$?
 - 0.35
 - 0.50
 - 0.56
 - 0.65
- In a study about household income conducted in a small town, it was found out that 7% of all families in the town earn less than P4,000 per month. Out of 64 families who were randomly selected, 10 families earn less than P4,000 per month. Is the sample large enough to use the Central Limit Theorem?
 - No, because $10/64 \leq 5$
 - No, because $64(0.07) \leq 5$
 - Yes, because $64 \geq 30$
 - Yes, because $64(0.93) \geq 5$
- In testing hypothesis involving population proportion, when do we say that the sample size (n) is sufficiently large to use the Central Limit Theorem?
 - if $n \geq 30$
 - if $n < 100$
 - if $np \geq 5$, $nq \geq 5$
 - if $n/p \leq 5$, $n/q \leq 5$
- Compute for the value of $\hat{p}$ if $n = 740$ and $x = 259$.
 - 0.35
 - 0.40
 - 0.52
 - 2.86
- Which formula for the test statistic is appropriate if the Central Limit Theorem is used in testing hypothesis on population proportion?
 - $Z_{\text{com}} = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$
 - $Z_{\text{com}} = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$
 - $z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$
 - $z = \frac{\hat{p} - p}{\sigma / \sqrt{n}}$
- An insurance company reported that 30% of those persons involved in minor traffic accidents this year have been involved in at least one traffic accident in the last three years. Believing it was too large, an advisory group decided to investigate this claim. A sample of 200 traffic accidents this year showed that

56 persons were also involved in another accident in the last three years. Determine the value of the population proportion.

- a. 0.28 b. 0.30 c. 3.57 d. 60.0
9. In problem no. 8, what is the value of $\hat{p}$?
- a. 0.28 b. 0.35 c. 3.57 d. 60.0
10. In a certain senior high school, it is estimated that approximately 15% of the students ride bicycles in going to school. In a random sample of 90 senior high students, 19 are found to ride bicycles in coming to class. What is the value of the population proportion?
- a. 0.15 b. 0.21 c. 0.29 d. 4.74
11. Which of the following test statistic is appropriate to use in testing hypothesis involving population proportion?
- a. t-test b. z-test c. p-test d. c-test
12. Before a nationwide election, a polling place was trying to see who would win. Which choice best represents the sample?
- a. a selection of male voters
 - b. a selection of female voters
 - c. a selection of voters over age 50
 - d. a selection of voters of different ages
13. A computer store surveys its clients who purchased laptop computers to ask what software the store should include in its computers. Identify the population.
- a. clients on the store
 - b. computer manufacturers
 - c. clients who are interested in software
 - d. clients who purchased laptop computers
14. In Karangalan State University, 78% of all students are receiving financial assistance or recipients of scholarship programs. The school paper selects a random sample of 100 students and 72% of the respondents say they are receiving some sort of financial support. Which of the following is true?
- a. 100 represents the 72% of the students.
 - b. 78% is the population proportion and 100 is the sample proportion.
 - c. 78% is the sample proportion and 78% is the population proportion.
 - d. 78% is the population proportion and 72% is the sample proportion.

15. In a learning study, 1,200 respondents were asked if they can assimilate concepts while watching television wherein 586 said YES. What is the population proportion of those who said NO?
- a. 0.48 b. 0.49 c. 0.51 d. 0.58



If you've got a perfect score, you deserve a 5 bonus points.
Congratulations!



Additional Activities

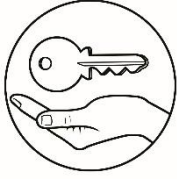
Activity 5: Think and Express

Directions: Carefully analyze and answer the following questions.

- A. 1. Give 3 examples showing proportions.
 2. Why is proportion considered a binomial variable?
- B. Think of an opportunity that once knocked on your door but you did not value. How did you feel about it?

“The opportunity to live a better life is in direct proportion to your willingness to change.”

~Raphael ‘Doctah’ Love~



Answer Key

What I Can Do Activity 4.1 Fast Break 1. 0.61 2. 0.35 3. 0.40 4. 0.28 5. 0.46	What I Have Learned 1. population proportion, p 2. sample proportion, $\hat{p}$ 3. successes in the samples size trials 4. x 5. n 6. z-test for proportion $Z_{com} = \frac{\sqrt{\frac{pq}{n}}}{\hat{p} - p}$ or $Z_{com} = \frac{\sqrt{\frac{pq}{n}}}{\hat{p} - p}$ 7. Central Limit Theorem 8. Binomial Experiment 9. $np \geq 5$ and $nq \geq 5$ 10. $np \geq 5$ and $nq \geq 5$	Remind Me Please.... <table border="1"><tr><td>R</td><td>A</td><td>T</td><td>E</td></tr></table> 1. Proportion or Percentage 2. C	R	A	T	E	Rainbow Connection (2pts each) 1. Senior citizen residents who own a cell phone 2. 10% of the residents 3. 500 senior citizen residents 4. 421 senior citizen residents 5. Residents in the city 6. Senior citizen residents
R	A	T	E				
What I Can Do Activity 4.2 Propop Puzzle Across 1. Proportion 3. Failure 4. Success 6. Limit Down 1. Population 2. Binomial 5. Ratio 7. Sample 8. Z_{com} 9. p-hat	What's More 1. $p = 0.80, \hat{p} = 0.26$ 2. $p = 0.65, \hat{p} = 0.80$ 3. $p = 0.25, \hat{p} = 0.28$ 4. $p = 0.45, \hat{p} = 0.54$ 5. $p = 0.40, \hat{p} = 0.56$	What I Know 1. D 2. C 3. C 4. B 5. C 6. C 7. D 8. B 9. A 10. C 11. B 12. D 13. C 14. C 15. B					

Assessment

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

What I Can Do

Activity 4.3

On My Own

1. Sufficiently large sample
2. Sufficiently large sample
3. Sufficiently large sample
4. Not sufficiently large sample
 $np=80 \cdot 0.06=4.8 < 5$
5. Sufficiently large sample
6. Sufficiently large sample
7. Not sufficiently large sample
 $nq=90 \cdot 0.05=4.5 < 5$
8. Sufficiently large sample
9. Not sufficiently large sample
 $np=120 \cdot 0.04=4.8 < 5$
10. Sufficiently large sample

What I Have Learned

1. population proportion, p
2. sample proportion, $\hat{p}$
3. successes in the samples
4. x
5. n
6. z-test for proportion
7. Central Limit Theorem
8. Binomial Experiment
9. $np \geq 5$ and $nq \geq 5$
10. $np \geq 5$ and $nq \geq 5$

$$Z_{\text{com}} = \frac{\frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}}{\sqrt{\frac{p(1-p)}{n}}}$$

or

$$Z_{\text{com}} = \frac{\frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}}{\sqrt{\frac{p(1-p)}{n}}}$$

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