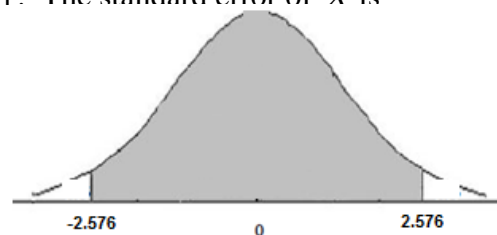




- I. Write TRUE if the statement is true. Otherwise, write FALSE.
1. The researcher can determine the value of the parameter from sample data through the use of the tools in Inferential Statistics.
 2. Selecting a sample of size n is an example of a random experiment.
 3. An event is a subset of the sample space.
 4. $P(X=x) = 0$ for any real number x and for any continuous random variable X .
 5. The probability that a random variable X following a normal distribution is within 3 standard deviations away from the mean is approximately 0.99.
 6. $P(Z \leq z_\alpha) = \alpha$
 7. If the elements in the sample are selected using simple random sampling (with or without replacement), then (X_1, X_2, \dots, X_n) is a random sample from a finite population.
 8. The standard error of a statistic is its standard deviation.
 9. By the Central Limit Theorem, given that X follows a normal distribution, we can use the normal distribution to approximate its distribution even if the sample size is not sufficiently large.
 10. As the degrees of freedom increases, the distribution of chi-square becomes more symmetric.
- II. Fill in the blanks.
1. The values of the discrete random variable X for which $f(x) > 0$ are called its _____.
 2. A sample of size 7 is selected using simple random sampling without replacement from a population of size 75 with mean $\mu = 100$ and standard deviation $\sigma = 4$. The variance of \bar{X} is _____.
 3. A sample of size 7 is selected using simple random sampling with replacement from a population of size 75 with mean $\mu = 100$ and standard deviation $\sigma = 4$. The standard error of \bar{X} is _____.
 4. The sampling distribution of a statistics is its _____.
 5. The area of the shaded region is _____.
 6. If $X \sim \chi^2(v=12)$, the $P(X < 23.337) =$ _____.
 7. A function whose value is a real number determined by each sample point in the sample space is called _____.
 8. As the degrees of freedom of the t-distribution increases, the variance approaches _____.
 9. By _____, the probability of an event if it can be expressed as the union of non-overlapping events A_1, A_2, \dots, A_3 , then $P(A) = P(A_1) + P(A_2) + \dots + P(A_n)$.
 10. The formula for the a priori definition of probability is _____.



III. Problem Solving.

1. Suppose the population consists of $N = 6$ elements namely A, B, C, D, E and F. The researcher wants to select a sample of size $n = 3$. A, B and C is a Statistics major. Others are Mathematics major.
 - a. Specify the sample space if the researcher uses SRSWOR by roster method using the notation, $\{X_1, X_2, X_3\}$ where X_i s are the selected elements.
 - b. Let A be the event of selecting a Statistics major. Define the event by roster method.
 - c. Find the $P(A)$.

2. If X is a continuous random variable and its CDF is:
$$F(x) = \begin{cases} x & , 0 < x < 1 \\ 2 - x & 1 \leq x < 2 \\ 0 & elsewhere \end{cases} .$$

Compute for the following probabilities.

- a. $P(0 \leq X < 2)$
 - b. $P(X < 1.2)$
 - c. $P(X = 1)$
 - d. $P(X \geq 1.99)$
3. Marshall commutes daily on his way to work from their apartment. The distribution of his trip times seems to follow a normal distribution. On the average, the trip takes 24 minutes with a standard deviation of 3.8 minutes.
 - a. What is the probability that a trip will take at least half an hour?
 - b. If he leaves the apartment at 8:35 am and Barney tells a trick in his Playbook from 8:50 am to 9:00 am, find the probability that he misses Stinson's story.
 4. Sheldon Cooper's IQ is 178. He studies a population where the mean of the scientist's IQ is 163 with a variance of 250. Approximate the probability of selecting a random sample of 100 scientist of the faculty whose sample mean IQ is less than his.
 5. Suppose the weights of the students in Statistics 115 are normally distributed with mean $\mu = 120$ lbs and standard deviation $\sigma = 10$ lbs. What is the probability of selecting a random sample of 25 students whose total weights will exceed the classroom's capacity if its maximum capacity is 2,875 lbs?
 6. Suppose that Sir KC was considering the use of new teaching materials to teach Statistics 117 to freshmen college students. He knows that the test scores of his students who will be given the new materials are normally distributed and claims that the mean $\mu = 85$ but unknown variance σ^2 . A random sample of 9 freshmen was given the new materials. The sample mean score was 78.29 and the sample standard deviation was 6. What is the probability of selecting a sample whose mean is less than or equal to the observed sample mean of 78.29?
 7. A manufacturer uses a machine to fill up their boxes with cereal. Using this machine, the net weight of cereal in a box is normally distributed with mean $\mu = 220$ grams and variance $\sigma^2 = 0.4731$ grams². What is the probability of selecting a random sample of size 10 whose sample variance is more than 1 gram²?

“Let the numbers speak to you. That's what Statistics is all about.”

-Gian Louise A. Roy