


Sampling distributions

Course Outcome:

Upon completion of this course, students will be able to:

1. Define and differentiate between population and sample, parameter and statistics in the context of theoretical distributions.
2. Explain the notion of sampling distribution of a statistic and calculate its standard error.
3. Derive distributions of functions of random variables using distribution function, moment generating function, and transformation of variables, including understanding the concept of Jacobian of transformation.
4. Apply the additive property of independent random variables in various scenarios.
5. Perform orthogonal and polar transformations on random variables.
6. Identify and describe sampling distributions arising from univariate normal distribution, such as χ^2 , t, and F distributions, along with their properties.
7. Analyze the distribution of sample mean and variance from a univariate normal distribution.
8. Analyze the joint distribution of sample means, variances, correlation coefficient, and regression coefficients arising from a bivariate normal distribution (null case).
9. Define non-central χ^2 , t, and F distributions and state their simple properties.
10. Calculate and analyze the distributions of sample order statistics, as well as the distribution of sample range.

Overall, students will develop a strong understanding of various sampling distributions and their properties, enabling them to apply this knowledge in statistical analyses and research.

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