

EEL 4930 Lecture 9:

Relation Between Statistically Independent and Mutually Exclusive Events

- One common mistake of students learning probability is to confuse statistical independence with mutual exclusiveness
- Remember:
 - Mutual exclusiveness is a _____
 - Statistical independence is a _____
- How does mutual exclusiveness relate to statistical independence?
 1. m.e. \Rightarrow s.i. ?
 2. s.i. \Rightarrow m.e. ?
 3. two events cannot be both s.i. and m.e., except in some degenerate cases
 4. none of the above

One-dimensional Statistics

Populations and Sampling



A _____¹ is a group of people, objects, events, observations, etc. that is being studied.



Often we are trying to assess some qualities or properties of that population. We call these _____².

When the population is too large to directly measure the parameters of interest, then we try to draw inferences from a subset of the population



A _____³ from a population is a subset of the population that can be used to draw inferences about the parameters of interest.

- A sample is usually drawn randomly from the population
- We usually require that each member of the sample is chosen independently from other members
- Often, but not always, each member in the population is equally likely to be included in the sample



A _____⁴ is a measurement of a quality or property on a sample that is used to assess a parameter of the whole population.

When samples are small, the statistics often provide little or no information about the parameters.

- For example, consider the problem of determining whether a coin is fair or two-sided. The result of flipping a coin one time provides no useful information for determining that

When samples are larger, they generally more accurately represent the population

There are generally two cases that we will encounter

1. When designing an experiment, the statistician can choose the population size to balance between being able to generate a useful statistic and the cost of taking more samples
2. Sometimes the experiment has already been carried out or is not under the control of the statistician. For instance, the statistician wants to assess something based on an existing survey or compare effects of a change in laws on a set of states. In this case, the population size is fixed

We will be using Python to compute statistics on samples and determine whether and how well these statistics represent the parameters of the populations being studied

Notes

¹population

²parameters

³sample

⁴statistic