**Random Samples**

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## Independently and Identically Distributed Random Variables

A set of random variables, are said to be IID random variables if they satisfy two conditions.

1. are independent. This means, for all possible sets of values , in ,
2. The random variables are identical. This means
   1. They have the same family of distribution.
   2. They have the same parameters.

Due to the second point, IID random variables have a common distribution function.

## Random Samples

We previously defined a population as a huge collection of elements, where each element is associated with a numerical value. It is not usually possible to collect data from every element in a population. As such, data is collected from a particular subset of the population. This subset is called the sample.

It is possible that a sample is biased towards a particular portion of the population and thus does not accurately represent the population. To avoid such biases, elements for a sample should be selected randomly. A sample created in such a manner is called a random sample.

A population will always have a common distribution, along with some parameters. The parameters are the population mean, , and the population variance, . Let the common distribution be denoted by .

Since we want to pick elements independently, the picking of one element should not affect the picking of any future elements. As such, the value that we pick, , is defined by the random variable , which in turn has the common distribution function . Similarly, we can pick values of for the random variables . Thus, these are IID random variables. A random sample is just a set of IID random variables.