

### Definitions

Element: The entity on which data are collected  
 Population: A collection of all the elements of interest

Sample: A subset of the population  
 Sampled population: The population from which the sample is collected

Frame: a list of elements that the sample will be collected from

### Sampling from an Infinite Population

Populations generated by an ongoing process are referred to as Infinite Populations: parts being manufactured, transactions occurring at a bank, calls at a technical help desk, customers entering a store  
 Each element selected must come from the population of interest, Each element is selected independently.

### Sampling Distribution of

Expected value of  $\bar{x}$ :  $E(\bar{x}) = \mu$   
 Standard Deviation of  $\bar{x}$  :

Finite Population:  $\sigma_{\bar{x}} = \sqrt{N-n/(N-1)} (\sigma/\sqrt{n})$   
 Infinite Population:  $\sigma_{\bar{x}} = \sigma/\sqrt{n}$

Z-value at the upper endpoint of interval= $-(largest\ value - \mu) / \sigma_{\bar{x}}$   
 Area under the curve to the left of the upper endpoint= $largest\ value - \mu / \sigma_{\bar{x}}$  on the z table

Z-value at the lower endpoint of the interval= $smallest\ value - \mu / \sigma_{\bar{x}}$   
 Area under the curve to the left of the lower endpoint= $smallest\ value - \mu / \sigma_{\bar{x}}$  on the z table

Probability=area under curve to left of upper endpoint-area under curve to left of lower endpoint  
 When selecting a different sample number, expected value remains the same. When the sample size is increased the standard error is decreased.

### Sampling from a Finite Population

Finite Populations are often defined by lists: Organization Member Roster, Credit Card Account Numbers, Inventory Product Numbers  
 A simple random sample of size n from a finite population of size N: a sample selected such that each possible sample of size n has the same probability of being selected

### Point Estimation

Point Estimation is a form of statistical inference. We use the data from the sample to compute a value of a sample statistic that serves as an estimate of a population parameter.

$\bar{x}$  is the point estimator of the population mean  
 $s$  is the point estimator of the standard deviation

$\bar{p}$  is the point estimator of the population proportion  
 $\bar{x} = (\sum xi) / n$

$s = \sqrt{\sum (xi - \bar{x})^2 / (n-1)}$   
 $\bar{p} = x/n$

### Sampling Distribution of

Expected value of  $\bar{p}$ :  $E(\bar{p}) = p$   
 Standard Deviation of  $\bar{p}$ ;

Finite Population:  $\sigma_{\bar{p}} = \sqrt{N-n/(N-1)} (\sqrt{p(1-p)/n})$   
 Infinite Population:  $\sigma_{\bar{p}} = \sqrt{p(1-p)/n}$

Z-value at the upper endpoint of the interval= $-(largest\ value - p) / \sigma_{\bar{p}}$   
 Area under the curve to the left of the upper endpoint equals z value of largest value- $p / \sigma_{\bar{p}}$

Z-value at the lower endpoint of the interval= $smallest\ value - p / \sigma_{\bar{p}}$   
 Area under the curve to the left of the lower endpoint= $z = value\ of\ smallest\ value - p / \sigma_{\bar{p}}$

Probability=area under curve to left of upper endpoint-area under curve to left of lower endpoint

