

DAILY ASSESSMENT

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Course:	Coursera	USN:	4AL17EC070
Topic:	Basic Statics	Semester & Section:	6 TH SEM & 'B' Section
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SESSION DETAILS

Basic Statistics > Week 5 > 5.04 The central limit theorem

Sample and sampling

Sampling distribution of sample mean and central limit theorem

- ✓ Reading: Sampling distribution of sample mean and central limit theorem 10 min
- ✓ Video: 5.03 The sampling distribution 7 min
- ✓ Video: 5.04 The central limit theorem 7 min
- ✓ Video: 5.05 Three distributions 7 min
- ✓ Reading: Reference 10 min

Sampling distribution of sample proportion and

5.04 The central limit theorem



bell-shaped population distribution
↓
∞
number of samples

THE SAMPLING DISTRIBUTION If you draw an infinite number of samples from a bell-shaped population

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Video: 5.04 The central limit theorem
7 min

Video: 5.05 Three distributions
7 min

Reading: Reference
10 min

Sampling distribution of sample proportion and example

Reading: Sampling distribution of sample proportion and example
10 min

Video: 5.06 Sampling distribution proportion
5 min

Video: 5.07 Example
6 min

Review

5.06 Sampling distribution proportion



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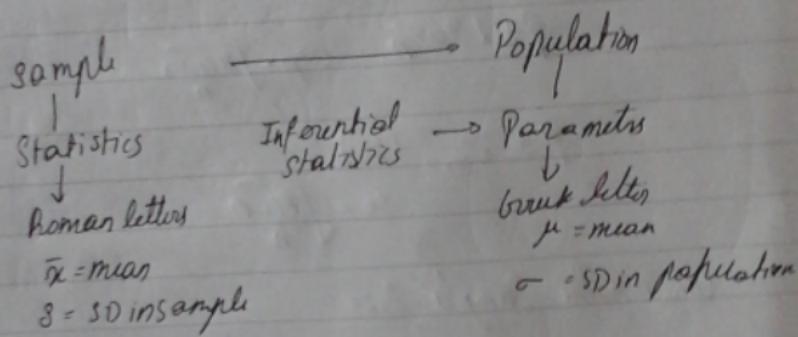
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Sample and Population

200 students

↓
COMPUTATIONS

univariate analysis bivariate analysis
mode means standard deviation
Pearson's R regression analysis
↓
numerical summaries
statistics



Sampling

Inferential statistics refers to method used to draw conclusion about a population, based on data coming from a sample

A sample is nothing more than a subset of a population yet for methods of inferential statistics, not samples appropriate.

The sampling distribution

Sample distribution is the link that helps researchers to draw conclusions about a population on the basis of only one sample

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The central limit theorem
bell shaped population distribution

number of sample

distribution of sample means is bell shaped
with a mean equal to the population mean

sampling distribution
of sample means.

central limit theorem

The sampling distribution of sample mean \bar{x}
is approximately normal

mean of sampling distribution

= population mean

$$\mu_{\bar{x}} = \mu$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Three distribution

1. Population distribution
2. Data / sample distribution.
- 3 Sampling distribution

Sampling distribution Proportion

sampling distribution of the sample mean

approximately bell-shaped if population is
normally distributed or if sample size is
sufficiently large (> 30)

sampling distribution of the sample proportion \rightarrow approximately bell-shaped
if $n \geq 15$ and $n(1-p) \geq 15$



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SESSION DETAILS



Basic Statistics > Week 6 > 6.04 CI for proportion

Inference and confidence interval for mean

Confidence interval for proportion and confidence levels

✓ Reading: Confidence interval for proportion and confidence levels
10 min

✓ Video: 6.04 CI for proportion
5 min

✓ Video: 6.05 Confidence levels
6 min

Sample size and example

Review

6.04 CI for proportion



CONFIDENCE INTERVALS *(And it happens to be the case that my daughter Lois especially likes to poo)*

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Basic Statistics > Week 6 > 6.06 Choosing the sample size

Confidence levels

✓ Reading: Confidence interval for proportion and confidence levels
10 min

✓ Video: 6.04 CI for proportion
5 min

✓ Video: 6.05 Confidence levels
6 min

Sample size and example

✓ Reading: Sample size and example
10 min

✓ Video: 6.06 Choosing the sample size
5 min

✓ Video: 6.07 Example
4 min

Review

6.06 Choosing the sample size



CONFIDENCE INTERVALS *Okay, I'm going to investigate how much sleeping hours parents in Amsterdam lose*

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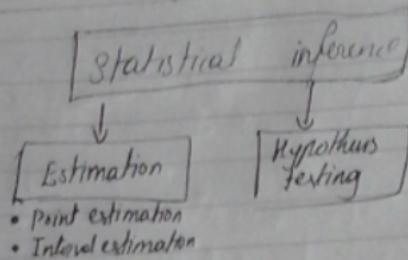
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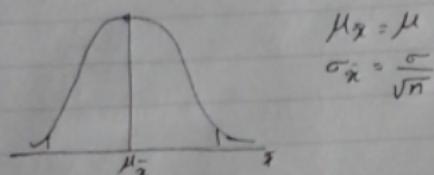


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Statistical inference



Confidence interval



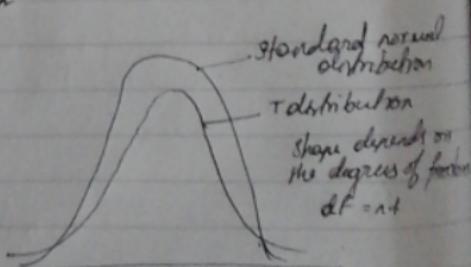
$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Confidence interval

estimate \rightarrow population mean
 In 95% of the samples the population value will fall within the confidence interval $\bar{x} \pm 1.96 \sigma_{\bar{x}}$
 where $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

T distribution

Dell-shaped symmetric
 a mean of zero
 takes into account



Assumption

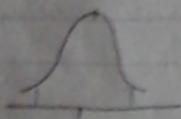
1. Randomization
2. approximately normal population distribution

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6.1 for Proportion

confidence interval
for a proportion

Sampling distribution of the sample proportion



$$\mu_p = p$$

$$\sigma_p = \sqrt{p(1-p)/n}$$

$$p \pm 1.96\sigma_p \quad \sigma_p = \sqrt{p(1-p)/n}$$

$$p \pm 2_{\text{SE}} \quad (\text{SE})$$

$$\text{SE} = \sqrt{p(1-p)/n}$$

Choosing the Sample Size

Sample size
mean

1. magnitude of desired margin of error

2. confidence level

3. variability

$$n = \frac{\sigma^2 z^2}{m^2}$$

sample size proportions

$$n = \frac{p(1-p)z^2}{m^2}$$



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