15/04/2019

① Descriptive Statistics

- mean
- Median
- Range, IQR, 5 # summary
- std
- Histogram

② Prediction based on samples,

distribution of Individuals

μ = mean

σ = st dev

Sampling distribution

If $n > 30$

Normally distributed

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

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

Assume

we know population sd but popn mean is unknown.

process:

① Decide on confidence level; that is for instance, 95% of the time the true popn mean will land in the interval.

② Decide on sample size.

③ Be told what popn std dev, σ is.

④ Build interval, that catches true popn mean, say 95% of the time.

→ find sample mean to construct the estimate.

① 90% CI

$n = 40$

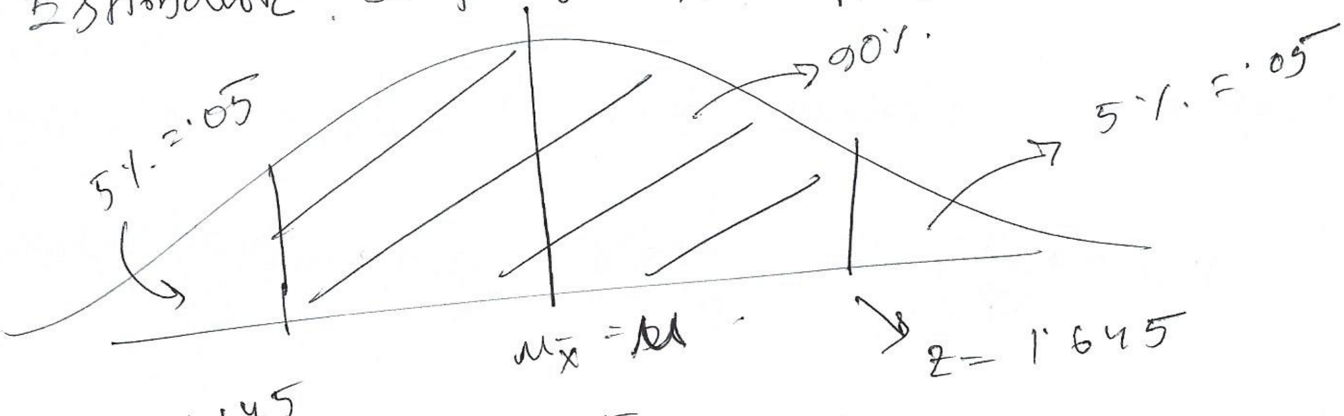
$\bar{x} = 75$

std dev *, $\sigma = 5$

$$\bar{x} - z_{\alpha/2} \cdot \sigma/\sqrt{n} < \mu < \bar{x} + z_{\alpha/2}\, \sigma/\sqrt{n}$$

$$\bar{x}\ \cancel{75} - 1.645 \cdot 5/\sqrt{40} < \mu < \cancel{75}\,\bar{x} + 1.645\ 5/\sqrt{40}$$

Estimator : Sampling distribution.



$\sigma = 5$

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

$75 \pm 1.645 * 0.79057$

75 ± 1.30048

$(73.6995 < \mu_{\bar{x}} < 76.30048)$

$$z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$$

$$-1.645 = \frac{\bar{x} - \mu_{\bar{x}}}{.79056}$$

$$(-1.645 \times .79056) + \bar{x} = \mu_{\bar{x}}$$

$$\mu_{\bar{x}} = -1.645 \times (.79056) + 75$$

$$= 76.30048$$

$\mu_{\bar{x}} = \mu$ is between 73.6995 & 76.3004 90%

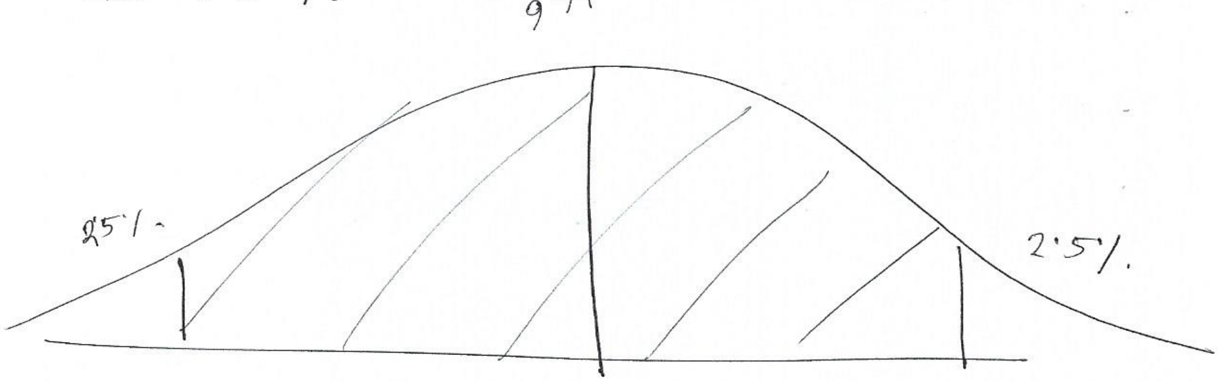
$\bar{x} \pm z^*\left(\frac{\sigma}{\sqrt{n}}\right)$ $\quad z^*\left(\frac{\sigma}{\sqrt{n}}\right) \rightarrow$ margin of Error

2. $n = 30$

$\bar{x} = 168$

$sd = 30$

$CI = 95\%$



$\bar{x} \pm z_{\alpha/2}^* \frac{30}{\sqrt{30}}$

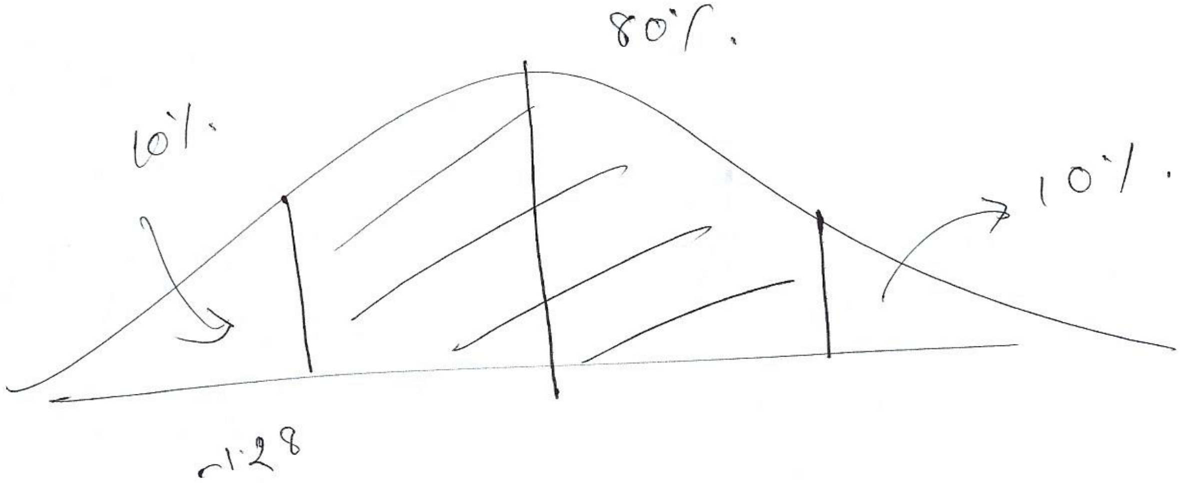
$168 \pm 1.96 \frac{30}{\sqrt{30}}$

~~166 ± 3.91230~~

~~(157.27769 , 171.91230) CI~~

168 ± 10.7353

$(157.2646$ to $178.7353)$ CI

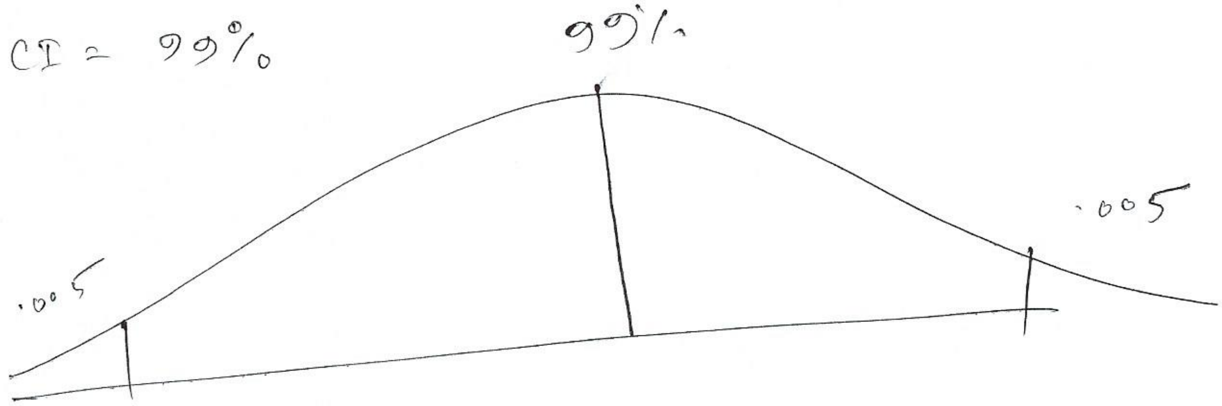


3. $\bar{x} = 5000$

$n = 50$

$\sigma_{\bar{x}} = 100$

CI = 99%



$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

$= 5000 \pm 2.576 * \frac{100}{\sqrt{50}}$. $\rightarrow$ CI