FORMULAS

Sample statistics

Sample mean: $\bar{x} = \frac{\sum x_i}{n}$, Sample standard deviation (definition) $s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$

Computational formula $s = \sqrt{\frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}}$

Population parameters:

Population mean: $\mu = \frac{\sum x_i}{N}$ Population standard deviation: $\sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{N}}$

or $\sigma = \sqrt{\frac{\sum x_i^2}{N} - \mu^2}$

Standard score or z-score $z = \frac{x - \mu}{\sigma}$ If $x \sim N(\mu, \sigma)$ then $z \sim N(0,1)$

Probability

P(E)=f/N P(A or B) = P(A) + P(B) - P(A and B)

Sampling Distribution of $\bar{x}$

$\mu_{\bar{x}} = \mu$, $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$, Standardized version of $\bar{x}$: $z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$

Confidence Intervals for μ

Confidence level C= $(1-\alpha) * 100\%$

Z-interval: $\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$ Margin of error: $E = z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$, Sample size estimation: $n = \left(\frac{z_{\alpha/2} \sigma}{E} \right)^2$

t-interval: $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$, df=n-1, Studentized version of $\bar{x}$: $t = \frac{\bar{x} - \mu}{s / \sqrt{n}}$