CRAFTON HILLS COLLEGE TUTORING CENTER

Chapter 6 Confidence Intervals

	Pop. Proportion, $\hat{p}$ 6.3	Mean, μ (σ Known) 6.1	Mean, μ (σ Unknown) 6.2	Standard Deviation, σ 6.4
Guidelines	1. Simple Random Sample 2. $n\hat{p} \geq 5 \leq n\hat{q}$	1. Simple Random Sample of the mean dist. 2. $n \geq 30$	1. Simple Random Sample of the mean dist. 2. $n \geq 30$	*Degrees of Freedom: df= n-1*
Critical Value	z_c	z_c	t_c	X_L^2 and X_R^2
Excel Command Critical Value	=NORM.S.INV$(1-(1-C)/2)$	=NORM.S.INV$(1-(1-C)/2)$	=T.INV$(1-(1-C)/2, \mathrm{df})$	X_L^2 =CHISQ.INV$(1-(1-C)/2, df)$ and X_R^2 =CHISQ.INV.RT$(1-(1-C)/2, df)$
Confidence Interval	$\hat{p} \pm z_c\sqrt{\frac{\hat{p}(\hat{q})}{n}}$ $E = z_c\sqrt{\frac{\hat{p}\hat{q}}{n}}$ $\hat{p} - E < p < \hat{p} + E$	$\bar{x} \pm z_c\frac{\sigma}{\sqrt{n}}$ $E = z_c\frac{\sigma}{\sqrt{n}}$ $\bar{x} - E < \mu < \bar{x} + E$	$\bar{x} \pm t_c\frac{s}{\sqrt{n}}$ $E = t_c\frac{s}{\sqrt{n}}$ $\bar{x} - E < \mu < \bar{x} + E$	**Lower Bound**: $\sqrt{\frac{(n-1)s^2}{X_L^2}}$ **Upper Bound**: $\sqrt{\frac{(n-1)s^2}{X_R^2}}$
Sample Size Needed	**With Prior Estimate Given ($\hat{p}$):** $\boldsymbol{n} = \hat{p}\hat{q}\left(\frac{Z_c}{E}\right)^2$ **No Prior Estimate Given ($\hat{p}$):** $\boldsymbol{n} = 0.25\left(\frac{Z_c}{E}\right)^2$	**Estimation of Pop. Mean (μ):** $\boldsymbol{n} = \left(\frac{Z_c \cdot \sigma}{E}\right)^2$	**t-distribution (t-value):** $\boldsymbol{t} = \frac{(\bar{x}-\mu)}{\left(\frac{s}{\sqrt{n}}\right)}$	**CHI Squared (Using Variance):** $\boldsymbol{x^2} = \frac{(n-1)s^2}{\sigma^2}$
Other Formulas	**Point Estimate ($\hat{p}$):** $\hat{\boldsymbol{p}} = \frac{x}{n}; \hat{\boldsymbol{p}} = \frac{(\mathrm{UB}+\mathrm{LB})}{2}$	**Point Estimate ($\bar{x}$):** $\bar{\boldsymbol{x}} = \frac{\sum x}{n}$	**Margin of Error for Data Set:** $\boldsymbol{E} = \frac{(\mathrm{UB}-\mathrm{LB})}{2}$	**Find Level of Confidence Using Z_c:** $\boldsymbol{Z_c} = \frac{E}{\sqrt{\frac{\hat{p}\hat{q}}{n}}}$ Find Right & Left p for $\pm Z_c$ Then, Left (p) – Right (p)= C

Common Critical Vales for Z_c

Level of Confidence	Critical Value Z_c
85% or 0.85	1.44
90% or 0.90	1.645
95% or 0.95	1.96
96% or 0.96	2.05
98% or 0.98	2.33
99% or 0.99	2.575

Notes:

UB: Upper Bound

LB: Lower bound

Square Root: =SQRT(DATA)

$\hat{\boldsymbol{p}} = \frac{x}{n}$

$\hat{\boldsymbol{q}} = (1-\hat{p})$

$\mathbf{df}: n-1$

$\boldsymbol{p} =$ Probability

$\boldsymbol{X_L^2}$=Left tail— $\chi^2_{1-(1-C)/2}$

$\boldsymbol{X_R^2}$=Right tail— $\chi^2_{1-(1-C)/2}$

$\boldsymbol{C}$: Confidence level