Stat 330X Formulas for 1 and 2 Sample Inference

Large Sample Confidence Limits

To Estimate	Limits
m	$\bar{x} \pm z\frac{s}{\sqrt{n}}$
p	$\hat{p} \pm z\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ or $\hat{p} \pm z\frac{1}{2\sqrt{n}}$
$m_1 - m_2$	$\bar{x}_1 - \bar{x}_2 \pm z\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}$
$p_1 - p_2$	$\hat{p}_1 - \hat{p}_2 \pm z\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$ or $\hat{p}_1 - \hat{p}_2 \pm z\frac{1}{2}\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}$

Intervals Derived from Ordered Data Values *(Continuous Distributions)*

Interval	Used As	Confidence Level
(ith smallest data point, jth largest data point)	C.I. for $Q(g)$	$1-\sum_{k=0}^{i-1}\binom{n}{k}g^k(1-g)^{n-k} - \sum_{k=0}^{j-1}\binom{n}{k}(1-g)^k g^{n-k}$
	P.I. for X_{n+1}	$1-\frac{i+j}{n+1}$
(smallest data point, largest data point)	T.I. for g of Dsn	$1-g^n - n(1-g)g^{n-1}$
(ith smallest data point, ∞)	C.I. for $Q(g)$	$1-\sum_{k=0}^{i-1}\binom{n}{k}g^k(1-g)^{n-k}$
	P.I. for X_{n+1}	$1-\frac{i}{n+1}$
	T.I for g of Dsn	$1-\sum_{k=0}^{i-1}\binom{n}{k}(1-g)^k g^{n-k}$

$\left(-\infty, \begin{matrix} j\text{th largest} \\ \text{data point} \end{matrix}\right)$	C.I. for $Q(g)$	$1-\sum_{k=0}^{j-1}\binom{n}{k}(1-g)^k g^{n-k}$
	P.I. for X_{n+1}	$1-\frac{j}{n+1}$
	T.I for g of Dsn	$1-\sum_{k=0}^{j-1}\binom{n}{k}(1-g)^k g^{n-k}$

Large Sample **Hypothesis/Significance Testing**

Null Hypothesis	Statistic	Reference Distribution
$H_0 : m = \#$	$Z = \frac{\overline{X} - \#}{S / \sqrt{n}}$	Standard Normal
$H_0 : p = \#$	$Z = \frac{\hat{p} - \#}{\sqrt{\frac{\#(1-\#)}{n}}}$	Standard Normal
$H_0 : m_1 - m_2 = \#$	$Z = \frac{\overline{X}_1 - \overline{X}_2 - \#}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$	Standard Normal
$H_0 : p_1 - p_2 = 0$	$Z = \frac{\hat{p}_1 - \hat{p}_2 - 0}{\sqrt{\hat{p}(1-\hat{p})}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$	Standard Normal

above $\hat{p} = \frac{n_1 \hat{p}_1 + n_2 \hat{p}_2}{n_1 + n_2}$