STA304/1003: Summer 2014 - FORMULA SHEET for Midterm Test

Some General Results:

1. $SE(pt.est) = \sqrt{\hat{V}(pt.est)}$

2. Approximate $100(1-\alpha)\%$ CI for a location parameter: $pt.est \pm z_{\alpha/2} SE(pt.est)$

3. Standard Normal Critical Values: $z_{0.005} = 2.58$, $z_{0.01} = 2.33$, $z_{0.025} = 1.96$, $z_{0.05} = 1.65$

4. SRS, STRS, Systematic, Two Stage Cluster point estimates are unbiased

5. Ratio estimates, One Stage Cluster sampling estimates are asymptotically unbiased

Simple Random Sampling:

Population Parameter	**Point Estimate**	**Variance of Point Estimate**	**Estimated Variance**
$S^2 = \frac{1}{N-1}\sum_{i=1}^{N}(y_i - \bar{y}_U)^2$	$s^2 = \frac{1}{n-1}\sum_{i\in\mathcal{S}}(y_i - \bar{y})^2$	–	–
$\bar{y}_U = \frac{1}{N}\sum_{i=1}^{N} y_i$	$\bar{y} = \frac{1}{n}\sum_{i\in\mathcal{S}} y_i$	$\left(1-\frac{n}{N}\right)\frac{S^2}{n}$	$\left(1-\frac{n}{N}\right)\frac{s^2}{n}$
$t = \sum_{i=1}^{N} y_i$	$\hat{t} = N\bar{y}$	$N^2\left(1-\frac{n}{N}\right)\frac{S^2}{n}$	$N^2\left(1-\frac{n}{N}\right)\frac{s^2}{n}$
$p = \bar{y}_U$; $y_i = \begin{cases} 1, & \text{with probability } p \\ 0, & \text{with probability } 1-p \end{cases}$	$\hat{p} = \bar{y}$	$\frac{N-n}{N-1}\frac{p(1-p)}{n}$	$\left(1-\frac{n}{N}\right)\frac{\hat{p}(1-\hat{p})}{n-1}$

Sample size for $100(1-\alpha)\%$ CI with margin of error, e :

$n = \frac{z^2_{\alpha/2}S^{*2}}{e^2 + \frac{z^2_{\alpha/2}S^{*2}}{N}} = \frac{n_0}{1+\frac{n_0}{N}}$; where $n_0 = \left(\frac{z_{\alpha/2}S^*}{e}\right)^2$

S^* is an estimate of S : either s or $\sqrt{p^*(1-p^*)}$, where p^* maximizes $p - p^2$.