Simple Random Sampling – Formula Sheet

Mean ($\bar{y}$)	**Variance** (s^2)	**Standard Deviation** (s)	**Coefficient of Variation** (CV)
$\bar{y} = \frac{\sum y_i}{n}$	$s_y^2 = \frac{\sum (y-\bar{y})^2}{n-1}$	$s_y = \sqrt{s_y^2}$	$CV = \frac{s_y}{\bar{y}} \times 100$

Standard Error ($s_{\bar{y}}$)	
Sampling with Replacement (or from infinite population)	Sampling without Replacement from a Finite Population
$s_{\bar{y}} = \sqrt{\frac{s_y^2}{n}}$	$s_{\bar{y}} = \sqrt{\frac{s_y^2}{n}\left(\frac{N-n}{N}\right)}$
where, $n = sample\ size$ and $N = population\ size$	

Confidence Intervals (95% confidence interval has alpha = 0.05)	**Percent Error** (PE)
$\bar{y} \pm t s_{\bar{y}}$ where, *t* (2-tailed) has *n* – 1 degrees of freedom (df)	$PE = \frac{t s_{\bar{y}}}{\bar{y}} \times 100$

Sample Intensity Required sample size need to achieve an allowable error (E) expressed as a desired half-width of a confidence interval (e.g. ± 500) or allowable error percent (A) expressed as a percent of the mean (e.g., 10%).	
Sampling with Replacement (or from infinite population)	Sampling without Replacement from a Finite Population
$n = \left(\frac{t \times s_y}{E}\right)^2$	$n = \frac{1}{\frac{1}{N} + \left(\frac{E}{t \times s_y}\right)^2}$
$n = \left(\frac{t \times CV}{A}\right)^2$	$n = \frac{1}{\frac{1}{N} + \left(\frac{A}{t \times CV}\right)^2}$

Stratified Random Sampling – Formula Sheet

Individual Stratum
Use simple random sampling equations for data from each stratum.

All Strata (i.e., population)

where,
$L = number\ of\ strata$
$n_h = number\ of\ units\ observed\ in\ stratum\ h$
$N_h = total\ number\ of\ units\ in\ stratum\ h\ (h = 1, \ldots, L)$
$N = total\ number\ of\ units\ in\ all\ strata\ \left(N = \sum_{h=1}^{L} N_h\right)$
$\bar{y}_h = mean\ of\ of\ stratum\ h\ (h = 1, \ldots, L)$
$s_h^2 = variance\ of\ stratum\ h\ (h = 1, \ldots, L)$

Population Mean

$$\bar{y}_{st} = \frac{\sum N_h \bar{y}_h}{N}$$

Population Standard Error

Sampling with Replacement (or from infinite population)	Sampling without Replacement from a Finite Population
$s_{\bar{y}_{st}} = \sqrt{\frac{1}{N^2} \sum \frac{N_h^2 s_h^2}{n_h}}$	$s_{\bar{y}_{st}} = \sqrt{\frac{1}{N^2} \sum \left[\frac{N_h^2 s_h^2}{n_h}\left(\frac{N_h - n_h}{N_h}\right)\right]}$

Confidence Intervals (95% confidence interval has alpha = 0.05)

$$\bar{y}_{st} \pm t s_{\bar{y}_{st}}$$

where, t (2-tailed) has $n - 1$ degrees of freedom (df) and df is approximated by $\sum(n_h - 1)$ for moderate to large sample sizes within each stratum

Percent Error (PE)

$$PE = \frac{t s_{\bar{y}_{st}}}{\bar{y}_{st}} \times 100$$