Population Statistic(s)	Sample Statistic(s) **Point Estimate**(s)	**(1-α) Confidence Interval** Interval Estimate	Hypothesis **Test Statistic**	Type I error = α **Critical Interval** with degrees of freedom; "sub α/2" (etc.) means area to the right.
1 mean: μ (mu)	$\bar{X}$ (X-bar)	$\bar{X} - z_{\alpha/2}\frac{\sigma}{\sqrt{n}} < \mu < \bar{X} + z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$ or; if σ is unknown and n < 30: $\bar{X} - t_{\alpha/2}\frac{s}{\sqrt{n}} < \mu < \bar{X} + t_{\alpha/2}\frac{s}{\sqrt{n}}$	$Z = \frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}}$; or $t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$	$(-z_{\alpha/2}, z_{\alpha/2})$ $(-t_{\alpha/2}, t_{\alpha/2})$ $d.f. = n - 1$
2 means: $\mu_1 - \mu_2$	$\bar{X}_1 - \bar{X}_2$	$\bar{X}_1 - \bar{X}_2 \pm z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$ or; if σ_1 and σ_2 are unknown but presumed equal, and n_1 or n_2 are less than 30: (Can test $H_0: \sigma_1 = \sigma_2$ vs. $H_1: \sigma_1 \neq \sigma_2$ w/ $\alpha = 0.3$.) $\bar{X}_1 - \bar{X}_2 \pm t_{\alpha/2}\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$ or; if σ_1 and σ_2 are unknown but presumed unequal, and n_1 or n_2 are less than 30: (Can test $H_0: \sigma_1 = \sigma_2$ vs. $H_1: \sigma_1 \neq \sigma_2$ w/ $\alpha = 0.1$.) $\bar{X}_1 - \bar{X}_2 \pm t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	$Z = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ $t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$ $t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$	$(-z_{\alpha/2}, z_{\alpha/2})$ $(-t_{\alpha/2}, t_{\alpha/2})$ $d.f. = n_1 + n_2 - 2$ Note: use POOLED standard deviation, in this case, for the TI83. $(-t_{\alpha/2}, t_{\alpha/2})$ $d.f. = \min(n_1, n_2) - 1$ Note: TI83's *d.f.* is different and a non-integer, in this case: NOT pooled.
3 or more means: $\mu_1, \mu_2, \ldots, \mu_k$		None, only a hypothesis test of $H_0: \mu_1 = \mu_2 = \cdots = \mu_k$ vs. H_1: not H_0	$F = \frac{s_B^2}{s_W^2} = \frac{MS_{FACTOR}}{MS_{ERROR}}$	$(0, F_{right})$ *d.f.*N. = $k - 1$ *d.f.*D. = $N - k$ (N = # of data) $F_{right} = F_{\alpha, d.f.N., d.f.D.}$

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1 standard deviation: σ (sigma)	s	$\sqrt{\frac{(n-1)s^2}{\chi^2_{right}}} < \sigma < \sqrt{\frac{(n-1)s^2}{\chi^2_{left}}}$	$\chi^2 = \frac{(n-1)s^2}{\sigma^2}$	$\left(\chi^2_{left}, \chi^2_{right}\right)$ $d.f. = n-1$ $\chi^2_{right} = \chi^2_{\alpha/2, n-1}$ $\chi^2_{left} = \chi^2_{1-\alpha/2, n-1}$
2 standard deviations: $\frac{\sigma_1}{\sigma_2}$	$\frac{s_1}{s_2}$	$\frac{s_1}{s_2\sqrt{F_{right}}} < \frac{\sigma_1}{\sigma_2} < \frac{s_1}{s_2\sqrt{F_{left}}}$	$F = \frac{s_1^2}{s_2^2}$	(F_{left}, F_{right}) $F_{right} = F_{\alpha/2, d.f.N., d.f.D.}$ $F_{left} = \frac{1}{F_{\alpha/2, d.f.D., d.f.N.}}$ **swap** *d.f.* *d.f.*N. = $n_1 - 1$ *d.f.*D. = $n_2 - 1$
1 (binomial) proportion: p	$\hat{p}$ (p-hat)	$\hat{p} - z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}} < p < \hat{p} + z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$	$Z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$; $q = 1 - p$	$(-z_{\alpha/2}, z_{\alpha/2})$
2 (binomial) proportions: $p_1 - p_2$	$\hat{p}_1 - \hat{p}_2$	$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$	$Z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\overline{p}\overline{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$	$(-z_{\alpha/2}, z_{\alpha/2})$
3 or more (multinomial) proportions: $p_1, p_2, \ldots, p_k$		None, but 2 possible hypothesis tests: H_0 : values for $p_1, p_2, \ldots, p_k$ vs. H_1 : not H_0 H_0 : proportions independent vs. H_1 : not H_0	$\chi^2 = \sum \frac{(O-E)^2}{E}$ row data $\chi^2 = \sum \frac{(O-E)^2}{E}$ table data	$\left(0, \chi^2_{right}\right)$ $\chi^2_{right} = \chi^2_{\alpha, k-1}$ *d.f.* = k – 1; k = # of proportions $\left(0, \chi^2_{right}\right)$ $\chi^2_{right} = \chi^2_{\alpha, d.f.}$ $d.f. = (\#rows - 1)\cdot(\#columns - 1)$
(linear) correlation: ρ (rho)	r	The confidence interval for ρ is too complicated for this course. Test $H_0 : \rho = 0$ vs. $H_1 : \rho \neq 0$.	$t = r\sqrt{\frac{n-2}{1-r^2}}$	$(-t_{\alpha/2}, t_{\alpha/2})$ $d.f. = n-2$