Final formula sheet

Stat 251 F19

General form of CI

$$statistic \pm bound$$

$bound = (critical\ value)(se)$ and $critical\ value = z^\star$ or $t^\star$
For se formulas, see table below

χ^2 (Chi-square)

$$\chi^2_{calc} = \sum \frac{(O-E)^2}{E}$$

GoF: $E = np_i$, $df = k-1$ where k is the number of categories

Independence: $E = \frac{(row_i\ total)(column_j\ total)}{grand\ total} = \frac{(n_i)(n_j)}{n}$, $df = (r-1)(c-1)$
where r is the number of rows and c is the number of columns.

Simple Linear Regression

Population model: $y_i = \beta_0 + \beta_1 x_i + \epsilon_i$
Sample model: $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x \quad or \quad \hat{y} = a + bx$
Residual: $e_i = y_i - \hat{y}_i$

1 and 2 sample formulas

Table 1: 1- and 2-sample

	Parameter	**Statistic**	*se*	z **vs.** t	**test statistic**	*df*
1 Mean *σ known*	μ	$\overline{X}$	$\frac{\sigma}{\sqrt{n}}$	z	$\frac{\overline{X}-\mu_0}{se}$	N/A
1 Mean *σ unknown*	μ	$\overline{X}$	$\frac{s}{\sqrt{n}}$	t	$\frac{\overline{X}-\mu_0}{se}$	$n-1$
1 proportion (%)	p	$\hat{p}$	$\sqrt{\frac{pq}{n}}$	z	$\frac{\hat{p}-p_0}{se}$	N/A
2 proportions CI	$p_1 - p_2$	$\hat{p}_1 - \hat{p}_2$	$\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$	z	N/A (see below)	N/A
2 proportions test	$p_1 - p_2$	$\hat{p}_1 - \hat{p}_2$	$\sqrt{\hat{p}\hat{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$ where $\hat{p} = \frac{X_1+X_2}{n_1+n_2}$	z	$\frac{\hat{p}_1-\hat{p}_2}{se_{test}}$	N/A
2 means independent	$\mu_1 - \mu_2$	$\overline{X}_1 - \overline{X}_2$	$\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	t	$\frac{\overline{X}_1-\overline{X}_2}{se}$	$min(n_1-1, n_2-1)$
2 means dependent	μ_D	$\overline{X}_D$	$\frac{s_D}{\sqrt{n}}$	t	$\frac{\overline{X}_D}{se}$	$n-1$