

Sta-209 Exam 2 Formulas

Normal Approximations

Statistic	Standard Error	Conditions
\hat{p}	$\sqrt{\frac{p(1-p)}{n}}$	$np \geq 10$ and $n(1-p) \geq 10$
\bar{x}	$\frac{\sigma}{\sqrt{n}}$	normal population or $n \geq 30$
$\hat{p}_1 - \hat{p}_2$	$\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$	$n_i p_i \geq 10$ and $n_i(1-p_i) \geq 10$ for $i \in \{1, 2\}$
$\bar{x}_1 - \bar{x}_2$	$\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$	normal populations or $n_1 \geq 30$ and $n_2 \geq 30$

Critical Values for the Middle P% of Various Distributions

P	80%	90%	95%	99%
z^*	1.282	1.645	1.960	2.576
$t^*(df = 5)$	1.476	2.015	2.571	4.030
$t^*(df = 10)$	1.372	1.812	2.228	2.764
$t^*(df = 15)$	1.341	1.753	2.131	2.602

The Chi-Squared Test Statistic

$$\chi^2 = \sum_i \frac{(\text{observed}_i - \text{expected}_i)^2}{\text{expected}_i}$$

Measures of Association for Contingency Tables

	Event	No Event
Exposure	A	B
No Exposure	C	D

$$\text{Relative Risk: } \widehat{RR} = \hat{p}_{\text{event}|\text{exposed}} / \hat{p}_{\text{event}|\text{not exposed}} = \frac{A}{A+B} / \frac{C}{C+D}$$

$$\text{Odds Ratio: } \widehat{OR} = \frac{\text{Odds of Event among Exposed}}{\text{Odds of Event among Not Exposed}} = \frac{A \cdot D}{B \cdot C}$$