STA 312f2012 Formulas

$Z_1 = \frac{\sqrt{n}(p-\pi_0)}{\sqrt{\pi_0(1-\pi_0)}}$ $Z_2 = \frac{\sqrt{n}(p-\pi_0)}{\sqrt{p(1-p)}}$ $p \pm z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$

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> qnorm(0.975)
[1] 1.959964
> qnorm(0.995)
[1] 2.575829
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$Z_2^2 \dot{\sim} \chi^2(1,\lambda)$, with $\lambda = n\,\frac{(\pi-\pi_0)^2}{\pi(1-\pi)}$ $\theta = \frac{\pi_{11}\pi_{22}}{\pi_{12}\pi_{21}}$

$P(n_1,\ldots,n_c) = \binom{n}{n_1\ \cdots\ n_c}\pi_1^{n_1}\cdots\pi_c^{n_c}$ $\ell(\boldsymbol{\pi}) = \prod_{i=1}^n \pi_1^{y_{i,1}}\pi_2^{y_{i,2}}\cdots\pi_c^{y_{i,c}} = \pi_1^{n_1}\pi_2^{n_2}\cdots\pi_c^{n_c}$

$G^2 = -2\log\left(\frac{\max_{\beta\in\mathcal{B}_0}\ell(\beta)}{\max_{\beta\in\mathcal{B}}\ell(\beta)}\right) = -2\log\left(\frac{\ell_0}{\ell_1}\right)$ $\widehat{\mu}_j = n\,\widehat{\pi}_j \quad , \quad \widehat{\mu}_{ij} = \frac{n_{i+}n_{+j}}{n}$

$X^2 = \sum_{j=1}^c \frac{(n_j-\widehat{\mu}_j)^2}{\widehat{\mu}_j} = n\,\sum_{j=1}^c \frac{(p_j-\widehat{\pi}_j)^2}{\widehat{\pi}_j}$ $G^2 = 2\sum_{j=1}^c n_j\log\left(\frac{n_j}{\widehat{\mu}_j}\right) = 2n\sum_{j=1}^c p_j\log\left(\frac{p_j}{\widehat{\pi}_j}\right)$

$$\lambda = n\sum_{j=1}^{c}\frac{[\pi_j-\pi_j(M)]^2}{\pi_j(M)} \qquad \lambda = 2n\sum_{j=1}^{c}\pi_j\log\left(\frac{\pi_j}{\pi_j(M)}\right)$$

$$X^2 = n\sum_{i=1}^{I}\sum_{j=1}^{J}\frac{(p_{ij}-p_{i+}p_{+j})^2}{p_{i+}p_{+j}} \qquad G^2 = 2n\sum_{i=1}^{I}\sum_{j=1}^{J}p_{ij}\log\left(\frac{p_{ij}}{p_{i+}p_{+j}}\right)$$

$$\lambda = n\sum_{i=1}^{I}\sum_{j=1}^{J}\frac{(\pi_{ij}-\pi_{i+}\pi_{+j})^2}{\pi_{i+}\pi_{+j}} \qquad \lambda = 2n\sum_{i=1}^{I}\sum_{j=1}^{J}\pi_{ij}\log\left(\frac{\pi_{ij}}{\pi_{i+}\pi_{+j}}\right)$$

$$\log\mu_{ijk} = \lambda + \lambda_i^X + \lambda_j^Y + \lambda_k^Z + \lambda_{ij}^{XY} + \lambda_{ik}^{XZ} + \lambda_{jk}^{YZ} + \lambda_{ijk}^{XYZ}$$

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> df = 1:8
> CriticalValue = qchisq(0.95,df)
> round(rbind(df,CriticalValue),3)
               [,1]  [,2]  [,3]  [,4]  [,5]   [,6]   [,7]   [,8]
df            1.000 2.000 3.000 4.000  5.00  6.000  7.000  8.000
CriticalValue 3.841 5.991 7.815 9.488 11.07 12.592 14.067 15.507

> # Table of non-centrality values needed for specified power
   Power
df       0.5       0.7       0.8      0.9
  1 3.841022  6.172007  7.848883 10.50739
  2 4.956736  7.701774  9.634685 12.65394
  3 5.760482  8.792389 10.902570 14.17149
  4 6.419476  9.682473 11.935286 15.40503
  5 6.991270 10.452523 12.827607 16.46946
  6 7.503313 11.140677 13.624286 17.41883
  7 7.971192 11.768443 14.350527 18.28355
  8 8.404641 12.349332 15.022138 19.08270
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