STA 441s18 Formulas

$y = \beta_0 + \beta_1 x_1 + \cdots + \beta_{p-1} x_{p-1} + \epsilon$ $\quad SST = SSR + SSE$ $\quad R^2 = \frac{SSR}{SST}$

$a = \frac{R_F^2 - R_R^2}{1 - R_R^2}$ $\quad a = \frac{sF}{n-p+sF}$ $\quad F = \left(\frac{n-p}{s}\right)\left(\frac{a}{1-a}\right)$

If an overall test has s numerator degrees of freedom and critical value c, the critical value of a Scheffé follow-up test with r degrees of freedom is $\left(\frac{s}{r}\right) \cdot c$.

$\ln\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1 x_1 + \cdots + \beta_{p-1} x_{p-1} = L$ $\quad \pi = \frac{e^L}{1+e^L}$

$\ln\left(\frac{\pi_1}{\pi_3}\right) = \beta_{0,1} + \beta_{1,1} x_1 + \ldots + \beta_{p-1,1} x_{p-1} = L_1$ $\quad \pi_1 = \frac{e^{L_1}}{1+e^{L_1}+e^{L_2}}$

$\ln\left(\frac{\pi_2}{\pi_3}\right) = \beta_{0,2} + \beta_{1,2} x_1 + \ldots + \beta_{p-1,2} x_{p-1} = L_2$ $\quad \pi_2 = \frac{e^{L_2}}{1+e^{L_1}+e^{L_2}}$

$\pi_3 = \frac{1}{1+e^{L_1}+e^{L_2}}$

$$\boldsymbol{\mu} = \left(\begin{array}{c} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_k \end{array}\right) = \left(\begin{array}{c} E[y_1|\mathbf{X}=\mathbf{x}] \\ E[y_2|\mathbf{X}=\mathbf{x}] \\ \vdots \\ E[y_k|\mathbf{X}=\mathbf{x}] \end{array}\right) = \left(\begin{array}{ccc} \beta_{0,1} + \beta_{1,1} x_1 + & \cdots & + \beta_{p-1,1} x_{p-1} \\ \beta_{0,2} + \beta_{1,2} x_1 + & \cdots & + \beta_{p-1,2} x_{p-1} \\ \vdots & \vdots & \vdots \\ \beta_{0,k} + \beta_{1,k} x_1 + & \cdots & + \beta_{p-1,k} x_{p-1} \end{array}\right)$$

Unknown (`type=un`)

$$\left(\begin{array}{cccc} \sigma_1^2 & \sigma_{1,2} & \sigma_{1,3} & \sigma_{1,4} \\ \sigma_{1,2} & \sigma_2^2 & \sigma_{2,3} & \sigma_{2,4} \\ \sigma_{1,3} & \sigma_{2,3} & \sigma_3^2 & \sigma_{3,4} \\ \sigma_{1,4} & \sigma_{2,4} & \sigma_{3,4} & \sigma_4^2 \end{array}\right)$$

Compound Symmetry (`type=cs`)

$$\left(\begin{array}{cccc} \sigma^2 + \sigma_1^2 & \sigma_1^2 & \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma^2 + \sigma_1^2 & \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma_1^2 & \sigma^2 + \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma_1^2 & \sigma_1^2 & \sigma^2 + \sigma_1^2 \end{array}\right)$$

Autoregressive (`type=ar(1)`)

$$\sigma^2 \left(\begin{array}{cccc} 1 & \rho & \rho^2 & \rho^3 \\ \rho & 1 & \rho & \rho^2 \\ \rho^2 & \rho & 1 & \rho \\ \rho^3 & \rho^2 & \rho & 1 \end{array}\right)$$