

# STA 441s24 Formulas

$$\begin{aligned}
 y &= \beta_0 + \beta_1 x_1 + \cdots + \beta_{p-1} x_{p-1} + \epsilon & SST &= SSR + SSE & R^2 &= \frac{SSR}{SST} \\
 a &= \frac{R_F^2 - R_R^2}{1 - R_R^2} & F &= \left(\frac{n-p}{s}\right) \left(\frac{a}{1-a}\right) & a &= \frac{sF}{n-p+sF}
 \end{aligned}$$

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  $\left(\frac{s}{r}\right) \cdot c$ .

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

$$\boldsymbol{\mu} = \begin{pmatrix} \mu_1 \\ \mu_2 \\ \vdots \\ \mu_k \end{pmatrix} = \begin{pmatrix} E[y_1 | \mathbf{X}=\mathbf{x}] \\ E[y_2 | \mathbf{X}=\mathbf{x}] \\ \vdots \\ E[y_k | \mathbf{X}=\mathbf{x}] \end{pmatrix} = \begin{pmatrix} \beta_{0,1} + \beta_{1,1}x_1 + \cdots + \beta_{p-1,1}x_{p-1} \\ \beta_{0,2} + \beta_{1,2}x_1 + \cdots + \beta_{p-1,2}x_{p-1} \\ \vdots \\ \beta_{0,k} + \beta_{1,k}x_1 + \cdots + \beta_{p-1,k}x_{p-1} \end{pmatrix}$$

Unknown (type=un)	Compound Symmetry (type=cs)	Autoregressive (type=ar(1))
$\begin{pmatrix} \sigma_1^2 & \sigma_{1,2} & \sigma_{1,3} & \sigma_{1,4} \\ \sigma_{1,2} & \sigma_2^2 & \sigma_{2,3} & \sigma_{2,4} \\ \sigma_{1,3} & \sigma_{2,3} & \sigma_3^2 & \sigma_{3,4} \\ \sigma_{1,4} & \sigma_{2,4} & \sigma_{3,4} & \sigma_4^2 \end{pmatrix}$	$\begin{pmatrix} \sigma^2 + \sigma_1^2 & \sigma_1^2 & \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma^2 + \sigma_1^2 & \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma_1^2 & \sigma^2 + \sigma_1^2 & \sigma_1^2 \\ \sigma_1^2 & \sigma_1^2 & \sigma_1^2 & \sigma^2 + \sigma_1^2 \end{pmatrix}$	$\sigma^2 \begin{pmatrix} 1 & \rho & \rho^2 & \rho^3 \\ \rho & 1 & \rho & \rho^2 \\ \rho^2 & \rho & 1 & \rho \\ \rho^3 & \rho^2 & \rho & 1 \end{pmatrix}$

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<http://www.utstat.toronto.edu/brunner/oldclass/441s24>