Formulas

Stat 151A, Fall 2018

October 6, 2018

1. $$\frac{RSS}{\sigma^2} \sim \chi^2_{n-p-1}.$$

2. If $\hat{\beta}$ is the ols estimator then (under assumptions that you must know)
$$\frac{\hat{\beta}_j - \beta_j}{s.e(\hat{\beta}_j)} \sim t_{n-p-1}$$

3. For testing a reduced model m against the full model M:
$$T := \frac{(RSS(m) - RSS(M))/(p-q)}{RSS(M)/(n-p-1)} \ \sim \ F_{p-q,n-p-1}.$$

4. In one way ANOVA, if $\mu_1 = \cdots = \mu_t$, then
$$T = \frac{\sum_{i=1}^{t} n_i(\bar{y}_i - \bar{y})^2/(t-1)}{\sum_{i=1}^{t}\sum_{j=1}^{n_i}(y_{ij} - \bar{y}_i)^2/(n-t)}$$
ha F-distribution with $t-1$ and $n-t$ degrees of freedom.

5. $$cov(AZ) \ = \ A\, cov(Z)\, A^T$$

6. $$\begin{aligned} \nabla_x(b^T x) &= b \\ \nabla_x(\tfrac{1}{2}x^T A x) &= A\, x. \end{aligned}$$

7. $$\hat{\beta}_1 \ = \ \frac{\sum_{i=1}^{n}(x_i - \bar{x})y_i}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$
and
$$\hat{\beta}_0 \ = \ \bar{y} - \hat{\beta}_1\bar{x},$$

8. $$x_0^T\hat{\beta} \pm t_{n-p-1}^{(\alpha/2)}\hat{\sigma}\sqrt{1 + x_0^T(X^T X)^{-1}x_0}.$$