One last topic in Ch. 4, then Ch. 5 Notes Worksheet
Filled In

Ch. 4 - Permutation / Randomization Tests -

Nonparametric based procedures that can be used in some situations where usual conditions for parametric inference fail.

1. Choose a statistic of interest.
2. Use permutation to obtain values of the stat that would be expected under H_0. That is, generate an empirical null sampling distribution.
3. Assess how unusual your observed stat is in the distribution. If it is unusual, then what?

Then this is evidence in favor of H_A, consider rejecting H_0.

Differs from the nonparametric bootstrap. Describe the diff. in your own words. (What values of the stat would the bootstrap generate?)

Bootstrap generates a range of values you expect from population, not based on a null model.

Ch. 5

5.1 Reviews common densities.

When might you use a Gamma over a Normal model for a variable?

Cases when variable must be +.

What about a Poisson as opposed to Binomial?

Poisson and Binomial model counts but have diff. ranges. Poisson for # arrivals in a time frame vs. Binomial # of successes in n trials.

5.2 Multivariate Normal

$$\mu = \begin{bmatrix} E(X_1) \\ E(X_2) \\ \vdots \\ E(X_p) \end{bmatrix} \qquad \Sigma = \text{covariance matrix} = \begin{bmatrix} \sigma_{11}^2 & \sigma_{12}^2 & \cdots & \\ \sigma_{21}^2 & \sigma_{22}^2 & & \\ \vdots & & \ddots & \\ & & & \sigma_{pp}^2 \end{bmatrix}$$

$$\sigma_{ii}^2 = Var(X_i)$$

$$\sigma_{ij}^2 = Cov(X_i, X_j)$$

Has some neat results and properties.

Name one.

Marginals are normal.

Conditional dists are normal.

If cov is 0, the rvs are $\perp$.

5.3 Key result: The variance of the MLE must always ___increase___ in the presence of nuisance parameters.

(This is why we have issues when estimating many parameters with their MLEs @ once.)

5.4 Multinomial Dist.

- extension of Binomial to k categories ($k > 2$)
- neat relationship with ___Poisson___ dist.

5.5 Exponential Families

Describes a general family construction of densities related by an exponential tilt.

Many dists. you know are in the exponential family (see practice problems).