HW 5 for Stat 7249 - Spring 2009

Due March 31

Reading in text for this assignment

- Chapter 9

Datasets

- see below

1. Assume $Y \sim P(\mu)$. Show that $\frac{Y-\mu}{\mu^{1/2}} \sim N(0,1) + O_p(\mu^{-1/2})$. [Hint: Compute the cumulants of this random variable and examine their behavior relative to the cumulants of a standard normal random variable.]

2. Assume $Y \sim P(\mu)$. Show that $E[Y^{1/2}] \approx \mu^{1/2}[1 - \frac{1}{8\mu}]$.

3. Let $Y \sim Bin(m,p)$. Show that as $m \to \infty$ with $\lambda = mp$ being fixed, that the distribution of Y will approach a Poisson with mean λ.

4. Consider an observational study done to assess the impact of working in a nickel refinery on development of cancer. Exposure was categorized as the number of years worked in one of seven 'high-risk' job categories. Data is available at http://faculty.washington.edu/norm/datasets.html with the appropriate dataset (Vol II, Appendix VII)). Focus on the lung cancer deaths as the outcome of interest (not nasal cancer). Fit models to examine the impact of exposure on the number of deaths, including the expected number of lung cancer deaths as an offset, adjusting for other factors as appropriate. (Note: the expected number of deaths is constructed from the person years of follow-up and standardized rates.) How should we then interpret the regression coefficients? What do you conclude? Is there evidence of overdispersion? If so, make an appropriate adjustment (or fit an appropriate model) and compare results.