Sections 1.3-1.4 Computer Exercise

This exercise can be completed in the package of your choice (Minitab, SAS, R, Excel, etc); the suggestions here are for R, the package of my choice.

1. For our Poisson example with y=9, graph the Wald $W = (\lambda - 9)^2/9$, Score $U = \lambda * (9/\lambda - 1)^2$ and Likelihood Ratio $L = -2 * (9 - \lambda + 9 * \ln(\lambda/9))$ test statistics in their χ^2 form as a function of λ–let λ range from 3 to 20 using `Lambda=seq(3,20)`. After plotting your initial curve, you can add other curves using the `lines` command–be sure to use the `lty` subcommand to vary your line style (e.g., `lines(Lambda,U,lty=2)`).

2. Draw a reference line for a 95% confidence interval on your graph(s). Compare the confidence regions for the three different methods by noting where the graphs cross the reference line. If you don't remember the cutoff value, type `qchisq(.95,1)` to find it; you can use the `abline` command (e.g., `abline(h=3.84)`) to plot your horizontal reference line.

3. Verifying the Wald CI coverage for Binomial parameter π, n=25. By the method of your choice (computing the test statistic $Z = \frac{Y - .5*n}{\sqrt{Y}}$ for $y = 0, \ldots, 25$ works well), find all y values that fail to reject $H_o : \pi = .5$ at $\alpha = .05$ for the Wald test–assume a two-sided test. Sum up their probabilities (type `help(dbinom)` for assistance) under the assumption $\pi = .5$ and compare your answer to the value given in Agresti's graph (which appears to be slightly greater than .95).