Stat 579   Midterm Exam 1 Review

1. Suppose $n_1 \sim BIN(n, \pi)$.

(see Homework Set #2)
(a) Derive the maximum likelihood estimate $\widehat{\pi}$.

(see Homework Set #6)
(b) The mle $\widehat{\pi}$ has an asymptotic normal distribution $\widehat{\pi} \sim N(\pi, \pi(1-\pi)/n)$.
Use the delta method to determine $\sigma^2(\log(\widehat{\pi}/(1-\widehat{\pi})))$, the asymptotic variance of the sample log odds.

(see Homework Set #3)
2. Consider data from a prospective study.
(a) Compute an estimate of the relative risk.
(b) Provide an interpretation of your result, stated in the context of the problem.
(c) Explain the difference between a prospective study and a retrospective study. What parameters can be estimated from a prospective study? What parameters can be estimated from a retrospective study?

(see Homework Set #5)
3. Consider data from a prospective study.
(a) Provide an equation for $\sigma^2\left(\log \widehat{RR}\right)$.

(b) Provide an equation for $\widehat{\sigma}\left(\log \widehat{RR}\right)$.

(c) Compute a 95% confidence interval for RR.

(see Homework Set #4)
4. Consider data from a retrospective study.
(a) Compute an estimate of the odds ratio.
(b) Interpret the direction of the association, stated in the context of the problem.
(c) What assumption is necessary for the sample odds ratio to serve as an estimate of the relative risk?

(see Homework Set #6)
5. Consider data from a retrospective study.
(a) Provide an equation for $\widehat{\sigma}\left(\log \widehat{\theta}\right)$.

(b) Does your answer to (a) depend on the sampling scheme? Explain.
(c) Compute a 95% confidence interval for $\log \theta$.
(d) Compute an estimate of the correlation γ. Provide an interpretation of the effect size, stated in the context of the problem.