Stat 579 Homework Set #6

1. Suppose $n_1 \sim BIN(n, \pi)$. Then $\widehat{\pi} = n_1/n$ 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.

2. Consider data from a retrospective study on the relationship between daily alcohol consumption and the onset of esophagus cancer.

	cancer	no cancer
daily alcohol consumption $>$ 80g	71	82
daily alcohol consumption $<$ 80g	60	441
Total	131	523

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

(b) Does your answer in (a) depend on the sampling scheme? Explain.

(c) Compute a 95% confidence interval for $\log\theta$.

(d) Compute $\widehat{\gamma}$ for the 2×2 table. Provide an interpretation of the effect size, stated in the context of the problem.

3. The following table summarizes the responses of $n = 91$ couples to the questionnaire item "Sex is fun for me and my partner."

	Wife's Rating			
Husband's Rating	never or occasionally	fairly often	very often	almost always
never or occasionally	7	7	2	3
fairly often	2	8	3	7
very often	1	5	4	9
almost always	2	8	9	14

Compute a Bayesian / likelihood interval estimate for the correlation γ.