Stat 579 Homework Set #5

1. Consider data from a prospective study on the relationship between daily aspirin use and the onset of heart disease.

	Disease	No Disease	Total
Placebo	28	656	684
Aspirin	18	658	676

(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 $\log RR$.

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

2. A diagnostic test for Covid antibodies is being studied. For a sample of $n_\delta = 122$ specimens with antibodies known to be present, the test returned $y_\delta = 103$ positive results. For a sample of $n_\gamma = 401$ specimens absent any antibodies, the test returned $y_\gamma = 399$ negative results.

(a) Compute a Bayesian/likelihood interval estimate for the sensitivity, $\delta = P(+|A)$.

(b) Compute a Bayesian/likelihood interval estimate for the specificity, $\gamma = P(-|NA)$.

3. The clinical trial for the Moderna vaccine resulted in $n_I = 196$ cases of symptomatic infection, with $y_C = 185$ cases from the control group, and $y_V = 11$ cases from the vaccine group.

Compute a Bayesian/likelihood interval estimate for the vaccine efficacy, VE.