Stat 536 Homework 6

Question 2 due: 10/10/09 Question 1 due: 10/13/08

1. **Pick and claim a topic (listed on Wiki) from the first part of the class and write a question to be shared with your fellow classmates for exam preparation. This question *and solution* will be turned in for credit. You cannot get full credit for overly easy or overly hard questions. Your question should be long answer (not multiple choice, T/F, or short answer) that could be completed as part of an in-class exam.**

2. **Krimbas & Tsakas (1971) were the first to suggest the use of temporal allele frequency data to estimate N_e. You will re-analyze their data using the estimators you learned about in class. The linked dataset contains the allele frequencies reported by Krimbas & Tsakas (1971) in their Table 1. The sample sizes are reported in their Table 1 and repeated below.**

Locus	1966	1967	1968
A	**474**	**312**	**400**
B	**469**	**281**	**409**

Please compute estimates of N_e using $\hat{F}_c$ and report 95% confidence intervals (see `R` function `qchisq` for χ^2 quantiles) for all pairs of dates. You may assume 4 generations per year and sampling scheme II.

Solution:

	1966	1967	1968
1966	–	161.40 (80.20, 294.56)	401.08 (189.71, 761.97)
1967	–	–	110.56 (56.33, 193.90)
1968	–	–	–

Please see that attached code for a solution shown in the table above (point estimates followed by 95% confidence intervals). From the confidence intervals, there seems to be substantial uncertainty in the estimate and no significant differences between the estimates from different years, especially remembering that the assumption of 4 generations per year may also be suspect. The effective population size is quite small, considering conservationists avoid $N_e < 50$ and target $N_e > 500$. This small number probably reflects the use of insecticide during the studied years, as described in Krimbas & Tsakas (1971).