BST 140.753 Assignment 4

February 17, 2005

Fine print Please feel free to give each other small hints, but otherwise students must complete assignments individually. Assignments can be hand written, but note that sloppily prepared work will be returned ungraded.

1. Consider the data and setting of Problem 3 from the last homework. Let (Y_{i1}, Y_{i2}) be the binary matched pairs for subject i. Consider the model $\text{logit}\{P(Y_{i1} = 1)\} = \alpha_i$ and $\text{logit}\{P(Y_{i2} = 1)\} = \alpha_i + \beta$

   a. Show that the conditional ML estimate of β is $\log n_{21}/n_{12}$.

   b. Show that the associated standard error is $\sqrt{1/n_{21} + 1/n_{12}}$.

   c. Note that neither the estimator, nor its standard error requires the diagonal cells; discuss this fact.

   d. Use conditional ML to analyze the prime minister's approval rating data.

2. Consider the data set below

		Party identification		
Gender	Race	Democrat	Republican	Independent
Male	White	132	176	127
	Black	42	6	12
Female	White	172	129	130
	Black	56	4	15

   a. Fit a baseline category logit model that uses gender and race to predict party idenfication that fits the data well. Fit using both multinomial fitting software and Poisson glms.

   b. Interpret the results.

3. Consider the data set below

		Response to Chemotherapy			
Therapy	Gender	Progressive Disease	No Change	Partial Remission	Complete Remission
Sequential	Male	28	45	29	26
	Female	4	12	5	2
Alternating	Male	41	44	20	20
	Female	12	7	3	1

a. Fit a proportional odds model with main effects for treatment and gender. Interpret.

b. Fit a second model that includes the interaction term. Interpret.

4. Show that the model $\text{logit}[P(Y \leq j)] = \alpha_j + \beta_j x$ may be misordered for some values of x.

5. Show that the quasi-symmetry log-linear model is equivalent to a multinomial model that specifies

$$(\pi_{ab}\pi_{bc}\pi_{ca})/(\pi_{ba}\pi_{cb}\pi_{ac}) = 1$$

for all a, b, and $c = 1, ..., I$ (where recall the π_{ij} are the multinomial cell probabilities).

6. For students taking the second year oral exam. Give an updated outline of the second year paper.