Review for Final of ST544

1. Models for testing $H_0 : X \perp Y$ or $X \perp Y|Z$ for nominal/ordinal X, Y (last part of Chapter 6) using LRT (difference of deviances from 2 models), CMH tests.

2. Models/methods for matched binary data from prospective studies

		Y_2 = 1	Y_2 = 0
Y_1	1	n_{11}	n_{12}
	0	n_{21}	n_{22}

		Y_2 = 1	Y_2 = 0
Y_1	1	π_{11}	π_{12}
	0	π_{21}	π_{22}

   (a) Inference on $\delta = \pi_{1+} - \pi_{+1} = \pi_{12} - \pi_{21}$.

   (b) McNemar's test for $H_0 : \delta = 0$:

$$\chi^2 = \frac{(n_{12} - n_{21})^2}{n_{12} + n_{21}} \overset{H_0}{\sim} \chi^2_1.$$

   (c) McNemar's test = CMH test: $H_0 : X \perp Y|$ subjects.

   (d) GEE (`Proc Genmod`) for making inference on δ and population-level odds-ratio

$$\theta = \frac{\pi_{1+}/(1 - \pi_{1+})}{\pi_{+1}/(1 - \pi_{+1})}.$$

   (e) Conditional logistic regression on subject-level odds-ratio different from the above θ.

3. Models/methods for matched binary data from matched case-control studies

		Cases' Exposure = 1	Cases' Exposure = 0
Controls' Exposure	1	n_{11}	n_{12}
	0	n_{21}	n_{22}

		Y_2 = 1	Y_2 = 0
Y_1	1	π_{11}	π_{12}
	0	π_{21}	π_{22}

   (a) McNemar's test = CMH test for H_0 : Exposure $\perp$ Case | matched pair.

   (b) Conditional logistic regression on pair-level odds-ratio and test for H_0 : Exposure $\perp$ Case | matched pair.

4. General square tables:

(a) Marginal homogeneity tests for nominal tables: SAS `Proc Catmod`.

(b) Marginal homogeneity tests for ordinal tables: Cumulative logit models. SAS implementation. Need data at subject level.

(c) Symmetry and quasi-symmetry model for nominal and ordinal tables. SAS implementation.

(d) Rater agreement, quasi-independent model, kappa, weighted kappa. SAS implementation.

(e) Bradley-Terry model for paired preference. SAS implementation.

5. GEE models for correlated categorical data, features of GEE, working correlation matrix, population-level inference.

(a) GEE model for repeated binary data.

(b) GEE model for clustered binary/binomial data.

(c) GEE model for longitudinal count data, what covariates are entered into the model?

(d) GEE model for longitudinal ordinal data, what covariates are entered into the model?

(e) Transitional model, good for prediction.

6. Generalized liner mixed models for categorical data, model specification, interpretation (subject-level).

(a) GLMM for repeated binary data

(b) GLMM for clustered binary/binomial data.

(c) Small area estimation using a GLMM.

(d) GLMM for longitudinal count data, what covariates are entered into the model?

(e) GLMM for longitudinal ordinal data, what covariates are entered into the model?