**Part II**

The hypothetical data for Problems 19-22 represent a randomized, controlled trial of 59 geriatric patients who were randomized to either an experimental treatment or placebo. Prior to randomization, baseline data on the number of falls during the preceding eight-week interval were recorded. Counts of falls during two-week intervals before each of four successive post-randomization visits were recorded. The following variables are contained in the FALLS.SAS7BDAT dataset:

* SUBJ: unique participant identification code
* AGE: the participant’s age
* TREATMENT: the experimental group to which the participant was randomized
  + 0 = placebo
  + 1 = experimental treatment
* BASELINE0: baseline falls count in the prior eight weeks
* FALLS2: the falls count for weeks 1-2
* FALLS4: the falls count for weeks 3-4
* FALLS6: the falls count for weeks 5-6
* FALLS8: the falls count for weeks 7-8

1. Under minimal assumptions and controlling for baseline falls count in the prior eight weeks trichotomized as <5 falls, 5-10 falls, or >10 falls, conduct a statistical test to assess the association between treatment group and improvement, where improvement is defined as having fewer falls across the entire eight-week study period than during the preceding eight weeks, and no improvement is defined as having the same number or more falls. Briefly interpret your results in 1-2 sentences.
2. Fit a Poisson regression model to the total falls counts calculated across the four post-randomization clinic visits. (Hint: You should be modeling a single total count for each patient.) Use treatment group (with placebo as the reference), baseline falls count trichotomized as <5 falls, 5-10 falls, or >10 falls (with <5 falls as the reference), and age as main effects. Determine whether there is evidence of over-dispersion. If so, adjust for over-dispersion using a scale parameter. For all parameters in the model, report the estimates, standard errors, test statistics, and p-values, with adjustment for overdispersion if needed. Determine the goodness of fit for this model with adjustment for overdispersion, if needed.
3. Using the model from Problem 20, what is the model-predicted mean falls count during the eight-week post-randomization interval for an individual having 5-10 baseline falls in the prior eight weeks, who is 80 years old, and was:
   1. randomized to receive the experimental treatment
   2. randomized to receive placebo
4. Regardless of your findings regarding over-dispersion in Problem 20, fit a negative binomial model to the total falls counts, with the same main effects as specified in Problem 20. For each parameter in the model, report the estimate, standard error, test statistic, and p-value. Compare these results to those you found in your final model (i.e., adjusted for over-dispersion, if necessary) in Problem 20.