1. The "deviance" of a Poisson regression model is -2 times the log likelihood of the Poisson regression model evaluated at the maximum likelihood estimates.

   True

   False

2. The null deviance is the deviance for the model with just an intercept term.

   True

   False

3. The saturated model is the model where each data point has it's own unique parameter.

   True

   False

4. The residual deviance can be used to test the hypotheses

   H_0 : The model with p predictors fits well enough. $vs.$

   H_1 : The model with p predictors does not fit well enough.

   True

   False

5. A plot of the deviance residuals against the linear predictor (η_i) can provide evidence of a lack of fit of a Poisson regression model.

   True

   False

6. Consider a model that attempts to explain the number of awards earned by students at a high school in a year based on their math final exam score and the type of program that they are enrolled in. The categorical predictor variable has three levels indicating the type of program in which the students is enrolled. The categorical predictor levels are “Remedial”, “Standard” and “Honors”. Here's some output from a Poisson regression.

   Consider fitting two models, one with both predictors, and one with just math final exam score as a predictor.

   Model 1: num_awards ~ math
   Model 2: num_awards ~ prog + math

Resid. Df	Resid. Dev	Df	Deviance	Pr(>Chi)
198	204			
196	189	2	14.6	0.00069 ***

   The test performed was a χ^2 test.

   The conclusion of this test is that the program variable is statisticallly significant.

   The conclusion of this test is that the program variable is not statisticallly significant.

   The hypotheses under consideration are:

   H_0 : The model with just math score fits well enough. $vs.$

   H_1 : The model with just math score does not fit well enough.

   The hypotheses under consideration are:

   H_0 : The model with math score and program fits well enough. $vs.$

   H_1 : The model with just math score fits well enough.

7. Consider a Poisson regression model with the response of the total number of cyclist counts at Manhattan Bridge in a 24 hour period. But suppose that cyclist counts on this bridge are such that, if an individual cycles over the Manhattan Bridge on a particular day, that individual will be *more likely* to cycle over the Manhattan Bridge the following day. So, an event occuring on one day impacts the probability of the event occuring on the next day. The distribution of the number of cyclists over the Manhattan Bridge will then be overdispersed with respect to the Poisson model.

   True

   False

8. Which of the following are potential causes of overdispersion?

   Having many zeros recorded for the response.

   A missing predictor variable.

   Outliers.

   A non-normal predictor variable.

   A dependent response variable.