1. **Mistletoe** Fit the following model to the "mistletoe.csv" data (See Homework 8 for a description of the data).

$$\text{infected.mndnr}_i \sim \text{Bern}(p_i)$$

$$\log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \text{mortal}_i + \beta_2 \text{phys}_i + \beta_3 \text{si}_i + \beta_4 \text{usize}_i + \beta_5 \text{height}_i + \beta_6 \text{dbh}_i + f(x_i, y_i)$$

   whree $f(x, y)$ is a smooth function of the (x,y) location of the stand. Use the results to identify any spatial regions of the study domain that have elevated risk of mistletoe presence that is not explained by the covariates in the linear predictor. Describe how this information might be useful to forest managers.

2. **Admissions** Consider the graduate school admissions data obtained by:

```
admissions <- read.csv("http://www.ats.ucla.edu/stat/data/binary.csv")
```

   containing the following columns:

   (a) admit - 1=admitted, 0=not admitted to graduate school.
   (b) gre - GRE score
   (c) gpa - undergraduate GPA
   (d) rank - categorical rank of the undergraduate school attended (smaller rank is better).

   Fit the following two models:

   Model 1:

$$\text{admit}_i \sim \text{Bern}(p_i)$$

$$\log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \text{rank}_i + f(\text{gre}_i) + g(\text{gpa}_i)$$

   Model 2:

$$\text{admit}_i \sim \text{Bern}(p_i)$$

$$\log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \text{rank}_i + \beta_2 \text{gre}_i + g(\text{gpa}_i)$$

   In these two models f and g are smooth functions of GRE and GPA, respectively.

   Compare the AIC values of the two models and explain the relationship between the two models, clearly describing the differences (if any) between the fitted models. Also clearly describe the relationship between GRE, GPA, and admittance to graduate school in the fitted models.