

**Example** *An insecticide for aphids.* An experiment was designed to examine how well the insecticide rotenone kills an aphid, called *Macrosiphoniella sanborni*, that feeds on the chrysanthemum plant.<sup>2</sup> The explanatory variable is the concentration (in log of milligrams per liter) of the insecticide. At each concentration, approximately 50 insects were exposed. Each insect was either killed or not killed. We summarize the data using the number killed. The response variable for logistic regression is the log odds of the proportion killed. Here are the data:

Concentration (log)	Number of insects	Number killed
0.96	50	6
1.33	48	16
1.63	46	24
2.04	49	42
2.32	50	44

- (1) Fit a logistic regression model.
- (2) Find a 95% confidence interval for  $\beta_1$ .
- (3) Find the odds ratio. Interpret.
- (4) Find a 95% confidence interval for the odds ratio.
- (5) Test whether the number of insects killed is independent of the concentration.