

1. In 1991 the price received by dairy producers in Massachusetts had fallen dramatically and producers argued they would soon be out of business without state intervention. An economist at the University of Massachusetts was asked to evaluate how many dairy producers would go out of business in the near future without some form of assistance.

a. State how a decline in the price of milk ( $prMilk$ ) is expected to affect the number of producers ( $nProd$ )?

b. The economist developed a model to forecast the numbers of dairy farms ( $nProd$ ) that would remain under alternative price scenarios.

$$nProd = \beta_o + \beta_{prMilk} prMilk + \beta_{prFeed} prFeed + \beta_{prEquip} prEquip + \varepsilon$$

where  $prEquip$  is the price index for machinery and  $prFeed$  is the price index for feeds.

Based on your answer in a. above, will  $\beta_{prMilk}$  be positive or negative ? \_\_\_\_\_

Will  $\beta_{prFeed}$  be positive or negative ? \_\_\_\_\_ Why?

Source	df

c. Assuming data from 20 years, fill out the first two columns of the ANOVA table.

2 A General Linear Model assumes normal errors. In contrast, the Generalized Linear Model allows one to use non-normal errors. Generalized Linear models are written as follows.

Identity Link:  $Response = \mu + \varepsilon$

Log Link:  $Response = e^{\mu} + \varepsilon$

Logit Link:  $\frac{p}{1-p} = e^{\mu} + \varepsilon$

where  $\varepsilon$  is the error and  $\mu$  is the systematic or structural model ( $\beta_o + \beta_1 X_1 + \beta_2 X_2 \dots etc$ )

What is the link for the  $nProd$  model ? \_\_\_\_\_

3 The symbol  $p$  represents the proportion of farms going out of business in any one year. Write a generalized linear model to evaluate whether the odds ( $p/(1-p)$ ) of a farm going out of business depend only on milk prices.