**25. a.** The total incidence of myocardial infarction (MCI) is reduced by aspirin ($X^2 = 26.4$ with 1 df). The odds ratio is 0.58, which is a considerable reduction in risk due to aspirin. The incidences of fatal and nonfatal are both significantly reduced as well ($X^2 = 6.2, 20.43, \text{df} = 1$). There is no indication that among those having MCI, the fatality rate was reduced ($p$-value $= 0.32$). The difference in the incidence of strokes was not statistically significant, $X^2 = 1.67$, df $= 1$.

**b.** There is no evidence that total cardiovascular mortality is decreased by aspirin, but the reduction in mortality due to myocardial infarction is significant.

**27.** The death penalty was given in 13% of the cases in which the victim was white and the defendant was not. In all other cases the death penalty was given only 5–6% of the time. A chi-square test of independence yields a statistic equal to 15.9 with 3 df, so the $p$-value is 0.001. Whether such a test is valid is debatable. The use of the test could be criticized on the grounds that these are all the data there are for the years 1993–97, the numbers speak for themeselves, and there is no plausible probability model on which to base probability calculations, like $p$-values. The use of the test could be defended by arguing that for a table with these row and column marginal totals, it would be very unlikely that there would be such variation of the proportions between rows if only chance were at work.

**29.** It depends on how the sampling is done. If the number of males and females are determined prior to the sample being drawn, a test of homogeneity would be appropriate. If only the total sample size are fixed, a test of independence would be appropriate. Management won't care, because the qualitative nature of the conclusion would be the same in either case.

## Chapter 14

**1. b.** $\log y = \log a - bx$. Let $u = \log y$ and $v = \text{lo}$

**d.** $y^{-1} = ax^{-1} + b$. Let $u = y^{-1}$ and $v = x^{-1}$.

**5.** This can be set up as a least squares problem with the parameter vector $\beta = (p_1, p_2, p_3)^T$ and the design matrix

$$X = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & -1 & 0 \\ 1 & 0 & -1 \\ 0 & 1 & -1 \end{pmatrix}$$

The least squares estimate is $\hat{\beta} = (X^T X)^{-1} X^T Y$. This gives, for example,

$$\hat{p}_1 = \frac{1}{2}Y_1 + \frac{1}{4}Y_2 + \frac{1}{4}Y_3 + \frac{1}{4}Y_4 + \frac{1}{4}Y_5$$

**13. a.** $\text{Var}(\hat{\mu}_0) = \sigma^2 \left[ \frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum (x_i - \bar{x})^2} \right]$