Homework 5

STAT 5333 (Spring 2021)

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Problem 7.1

In Table 2.1, X = gender and Y = belief in an afterlife.

Table 2.1	Yes (Y = 1)	No (Y = 2)
Females (X = 1)	509	116
Males (X = 2)	398	104

(a) Deviance $G^2 = 0.8224$, Pearson's $X^2 = 0.8246$, $df = 1$. Based on X^2, p-value $= 0.3638 > 0.05$. Hence, we cannot reject the null hypothesis and loglinear model of independence is a valid assumption.

(b) Here, $\hat{\lambda}_1^Y = 1.4165$, $\hat{\lambda}_2^Y = 0$

$$\log \frac{P(Y=1)}{P(Y=2)} = \log \theta = \lambda_1^Y - \lambda_2^Y$$

Given gender, the estimated odd, $\hat{\theta} = e^{\hat{\lambda}_1^Y} = e^{1.4165} = 4.1227$

Problem 7.2

Here, $\hat{\lambda}_{11}^{XY} = 0.1368$ and log odds ratio $\log \theta = \lambda_{11}^{XY}$. The estimated odds ratio $\hat{\theta} = e^{\hat{\lambda}_{11}^{XY}} = e^{0.1368} = 1.1466$