泊松分布：$P(x=k)=\dfrac{\lambda^k e^{-\lambda}}{k!}$

$L(\lambda;x)=\prod P(x_i|\lambda)=\prod\left(\dfrac{\lambda^{x_i}e^{-\lambda}}{x_i!}\right)$

$l(\lambda;x)=\sum\left[x_i\log\lambda-\lambda-\log(x_i!)\right]$

$\dfrac{\partial l}{\partial\lambda}=\sum\left[\dfrac{x_i}{\lambda}-1\right]=0 \Rightarrow \dfrac{\sum x_i}{n}=\lambda$

即 $\hat{\lambda}=\frac{1}{n}\sum_{i=1}^{n}x_i=\bar{x}$

即 $\bar{x}=\frac{1}{n}\sum_{i=1}^{n}x_i$ 是 λ 最大似然估计值

$$\underbrace{1+2+2}_{5}+\underbrace{1+2+2}_{5}+1+\underbrace{1+1+1}_{4}+4 \quad =18$$

本题：$\eta=\alpha+\beta_1x_1+\beta_2x_2$

$L=\prod_{i=1}^{35}\dfrac{e^{-\hat{u}_i}\hat{u}_i^{y_i}}{y_i!} \Rightarrow l=-\sum_{i=1}^{35}\hat{u}_i+\sum_{i=1}^{35}y_i\log\hat{u}_i-\sum_{i=1}^{35}\log(y_i!)$

$=-\sum_{i=1}^{35}\lambda+\sum_{i=1}^{35}x_i\log\lambda-\sum_{i=1}^{35}\log(x_i!)$

$=\underline{-10e^{\hat{\alpha}+\hat{\beta}_1}-5e^{\hat{\alpha}+\hat{\beta}_2}-20e^{\hat{\alpha}}+18\hat{\alpha}+11\hat{\beta}_1+3\hat{\beta}_2}-\underbrace{2.772589}$

$-4\ln 2$

$-\ln 16$

$$\frac{\partial l}{\partial \alpha}=-10e^{\hat{\alpha}+\hat{\beta}_1}-5e^{\hat{\alpha}+\hat{\beta}_2}-20e^{\hat{\alpha}}+18=0$$

$$\begin{cases}\dfrac{\partial l}{\partial \beta_1}=-10e^{\hat{\alpha}+\hat{\beta}_1}+11=0\\[2ex] \dfrac{\partial l}{\partial \beta_2}=-5e^{\hat{\alpha}+\hat{\beta}_2}+3=0\end{cases}$$

记住：10对应 class 1中观测值数 x_1
5对应 class 2中 —— x_2
20对应 class 3中 —— 整体

18对应 所有观测值加和
11对应 class 1中 ——
3对应 class 2中 ——