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9.2

1. (1) $X \sim B(m,p)$ $E(X)=mp$ $p=\frac{E(X)}{m}=\frac{\bar{x}}{m}$ 矩估计量为 $\frac{\bar{x}}{m}$

$L(p)=P(X=x_1)\times P(X=x_2)\times P(X=x_3)\cdots\times P(X=x_n)$ $P(X=x_i)=C_m^i p^i(1-p)^{m-i}$

$l(p)=\ln L(p)$ $\frac{\partial l(p)}{\partial p}=0$ 求得 $p=\frac{\bar{x}}{m}$

(2) $X\sim E(\lambda)$ $E(X)=\frac{1}{\lambda}$ $\therefore \hat{\lambda}=\frac{1}{\bar{x}}$ 矩估计量为 $\frac{1}{\bar{x}}$

$L(\lambda)=P(X=x_1)\times\cdots\times P(X=x_n)$ $P(x=x_i)=\begin{cases}\lambda e^{-\lambda x} & x>0\\ 0 & \text{其他}\end{cases}$

$l(\lambda)=\ln L(\lambda)=\ln(\lambda^n\cdot e^{-\lambda\sum_{i=1}^n x_i})$

$\frac{\partial l(\lambda)}{\partial \lambda}=0$ 求得 $\lambda=\frac{1}{\bar{x}}$

2. $X\sim P(\lambda)=\frac{\lambda^x}{x!}e^{-\lambda}$

$E(X)=\lambda$ $\therefore$ 矩估计量为 $\lambda=\bar{x}$

$L(\lambda)=P(X=x_1)\times P(X=x_2)\times\cdots\times P(X=x_n)$ $l(\lambda)=\ln L(\lambda)$ $\frac{\partial l(\lambda)}{\partial \lambda}=0$ 求得 $\lambda=\bar{x}$

$\bar{x}=E(X)=0\times\frac{12}{50}+1\times\frac{20}{50}+2\times\frac{10}{50}+3\times\frac{2}{50}+4\times\frac{1}{50}=1$

$\therefore$ 矩估计量=1 最大似然估计量=1.

解 $L(p)=P(X=x_1)\times P(X=x_2)\times P(X=x_3)\times\cdots\times P(X=x_n)=p^n(1-p)^{\sum_{i=1}^n(x_i-1)}$

$l(p)=\ln L(p)=\ln p^n(1-p)^{\sum_{i=1}^n(x-1)}=n\ln p+\sum_{i=1}^n(x_i-1)\ln(1-p)$

$\frac{\partial l(p)}{\partial p}=0 \Rightarrow \frac{n}{p}-\frac{\sum_{i=1}^n(x_i-1)}{1-p}=0 \Rightarrow p=\frac{n}{\sum_{i=1}^n x_i}=\frac{1}{\bar{x}}$

$\therefore E(X)=\int xf(x)dx=\int_0^\theta xf(x)dx=\int_0^\theta \frac{2x^2}{\theta^2}dx=\frac{2x^3}{3\theta^2}\Big|_0^\theta=\frac{2}{3}\theta$

$\therefore \theta=\frac{3}{2}\bar{x}$ $\therefore$ θ 的矩估计量 $\frac{3}{2}\bar{x}$