Announcements

Wednesday: Quiz 2 / HW 10 accordue (compusion)
Today: Review

OH , 4-day 11:30 -12:30

reconclude wed out to trusday 3-4:15 or s

Friday: Chang view stroll, proper

NOTE: updated 10/24 0:30 um
New stull (corrections are
Wightighted

$$(x_{i}) = 0 = v(x_{i})$$

$$(x_{i}) = 0 = v(x_{i})$$

$$(x_{i}) = E(x_{i}^{2}) - E(x_{i})^{2}$$

$$\Rightarrow E(x_{i}^{2}) = v(x_{i}) + E(x_{i})^{2}$$

$$= 0 + 0^{2}$$

$$\Rightarrow coive Arr \theta$$

$$(\theta) = \Pi \frac{g^{*}}{y_{i}} e^{-n\theta} \prod_{y_{i}} \frac{1}{y_{i}}$$

$$(\theta)^{2} = \Sigma y_{i}^{2} \ln \theta - n\theta \ln e + \ln \Pi \frac{1}{y_{i}}$$

$$l(\theta) = \sum_{i=1}^{n} l(\theta) = \sum_{i$$

(0) x1 , ... , xn ~ Poi((0)

(a) $E(x_i) = 0 = v(x_i)$

 $V(x_i) = E(x_i^2) - E(x_i)^2$

$$\frac{\partial l}{\partial \theta} = \frac{\sum y_i}{\theta} - n = 0$$

$$\frac{\sum y_i}{\hat{\theta}} = \frac{n}{n} \sum y_i = \hat{y}$$

$$\begin{array}{cccc}
\ln \theta & -n\theta & \ln \theta \\
\hline
\theta & & & & \\
\hline
\Sigma y; & & & & \\
\hline
\end{array}$$

$$\ln \theta - n\theta \ln \theta$$

$$\frac{\partial}{\partial x} = \frac{\partial}{\partial x} = \frac{\partial}$$

$$\sum_{i=1}^{n} \sum_{i=1}^{n} e^{-n\theta} \prod_{i=1}^{n} \frac{2}{y_{i+1}}$$

$$(\ln \theta - n\theta \ln e)$$

$$e^{-n\theta} \prod \frac{2}{y_i}$$

$$\theta - n\theta \ln e +$$

$$\frac{\partial}{y!} \ell$$

$$= \frac{2}{y!} \ell$$

$$= \frac{2}{y!} \ell$$

$$= \frac{2}{y!} \ell$$



n campul

$$|C| = -E(\frac{3^2 I}{3\theta^2}) - E(\frac{\Sigma Y!}{\theta^2}) = \frac{1}{\theta^2} \sum E(Y_1)$$

$$= \frac{1}{\theta^2} \cdot n\theta = \frac{n}{\theta}$$

$$= \frac{1}{\theta^2} \cdot n\theta = \frac{1}{\theta}$$

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$$= \frac{1}{\theta} \cdot n\theta = \frac{1}{\theta}$$

$$= \frac{1}{$$

(incl We did
$$\frac{1}{2\theta}$$
 in (6)

Id) (PLB exprise (corporate) does not depend on θ , θ (θ)= θ)

Var(θ) $\frac{1}{2}\frac{1}{n\Sigma(\theta)}$ $\frac{1}{n}\frac{1}{n\theta}$ $\frac{1}{n}\frac{1}{n\theta}$

PLB cumplies [cumporal f] does not de
$$Var(\hat{\theta}) \ge \frac{1}{n\Sigma(\theta)} = \frac{1}{nJ\theta} = \frac{\theta}{nJ}$$

$$V(\bar{x}) = V_{f}^{f} \Sigma \chi_{i} = \frac{1}{n^{2}} \cdot n \cdot \theta = \frac{\theta}{n}$$

$$Var(\hat{\theta}) \geq \frac{1}{n\Sigma(\theta)} = \frac{1}{n/\theta} = \frac{\theta}{n}$$

$$V(\tilde{x}) = V_{H}^{2} \Sigma \chi_{1}^{2} = \frac{1}{2} \times \theta = \frac{\theta}{2}$$

Var
$$(\hat{\theta}) \ge \frac{1}{n\Sigma(\theta)} = \frac{1}{n/\theta} = \frac{\theta}{n}$$

Var $(\hat{\theta}) \ge \frac{1}{n\Sigma(\theta)} = \frac{1}{n/\theta} = \frac{\theta}{n}$

V($(\hat{x}) = V_{t}^{(1)} \Sigma X_{t}^{(1)} = \frac{1}{n^{2}} \cdot n \cdot \theta = \frac{\theta}{n} \implies X$

much us much upon (f) does not depend on θ , $E(\theta) = \theta$)

Ond is much upon (f) does not depend on θ , $E(\theta) = \theta$)

 $V[\hat{\theta}] \ge \frac{1}{I_{\nu}(\theta)}$ where $I_{\nu}(\theta) = -E \left[\frac{\partial^2 \ell}{\partial \theta^2} \right]$

$$V(\bar{x}) = V_{\theta}^{(1)} \Sigma K_{\theta}^{(1)} = \frac{1}{n^{2}} \cdot n \cdot \theta = \frac{\Theta}{\Delta} \implies \bar{x} \text{ much CR (B)}$$

$$OND is MUNTE$$

$$(PLB: V(\hat{\theta}) \ge \frac{1}{nT(B)} \text{ where } I(\theta) = -E\left[\frac{\partial^{2} f_{x}}{\partial \theta^{2}}\right]$$

$$NOK I_{n}(\theta) = nI(\theta)$$

$$DOK \ I_n(\theta) = nI(\theta)$$

By fauroveration true,
$$\Pi y_i$$
 is suff. for α

(b) $f(x_i) = \alpha \beta = \frac{\alpha}{2} = x$

(d) By CLT, X~ MQ, ~



 $V(\hat{a}) = V(\frac{1}{h} \sum_{i=1}^{h} \sum_{i=1}^{h} a_i \cdot n \cdot V(x_i) = \frac{4}{h} \cdot \alpha \cdot \frac{1}{4}$

By delta method, $z\bar{x} \sim N(2\alpha, 4\frac{\alpha}{m})$

(A) By ROO-Blackwell, X not a function of T= TIX:

=) d' = E(X | T=t) will have strictly

~ N(2d, =)



= = = (5/4)

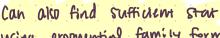
asymp. various (same as exact in





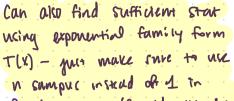


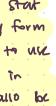


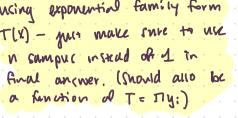


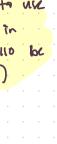












3 (a)
$$l(\lambda) = \prod_{i=1}^{n} \lambda^{2} x_{i}^{-2} e^{-\lambda/\lambda i}$$

(b)
$$L(\lambda) = \lambda^{2n} e^{-\lambda \sum \frac{1}{x_i}}$$
. $\prod \frac{1}{x_i^2}$ \forall (an also find via exponential family. Not necessarily = but should be a function of $\sum \frac{1}{x_i}$.

By fact theorem. $\sum k^{-1}$ sull for λ

$$|||||| = 2n \text{ in } \lambda - \lambda \sum_{i=1}^{n} \ln e_i + 2$$

(i)
$$L(\lambda) = 2n \text{ en } \lambda - \lambda \sum_{i=1}^{n} lne + \sum_{i=1}^{n} ln \frac{1}{\lambda_{i}}$$

(d) MUE has large sumpre diet N(1, I(0))

(1) By mvariance of MLB.

 $I(\gamma) = E\left(\frac{3\gamma_0}{3\sqrt{1}}\right) = -E\left(-\frac{\gamma_0}{5m}\right) = \frac{\gamma_0}{5m} \quad \text{in} \quad \gamma = \frac{\gamma_0}{3m}$

$$\lambda$$
) = 2n en $\lambda - \lambda \sum \frac{1}{2}$; lne + \sum

=
$$2n \ln \lambda - \lambda \sum_{i} \ln e + i$$

$$\frac{\partial l}{\partial \lambda} = \frac{2n}{\lambda} - \sum \frac{1}{x} = 0$$

) = 2n = 2n

PIMLE = log (\hat{\hat{\chi}}_{mlb}) = log (\frac{2h}{\subsection{\chi}{\sin}{\sin\eta}}\simen\chi}{\sin\eta}}}}}}}}}}}} \right)

(a) Face. MLF 15 asymptoxically unbineed

(b) Fare. LOW tehr as \$ => pr

que ansitraring close to pe, but not

(6) Falce - X is consistent for p., so only the of E(Xi) = 0

(d) (RLB: V[\$) > 1 VI(8) or ony

 $V(\overline{X}) = V(\frac{1}{n} \overline{Z}X;) = \frac{1}{n^2} \cdot n \cdot V(X;) = \frac{0^{-2}}{n}$

X meets LRIB, so it is MULLE.
Us and is unbiased.

· True:

act. of CRIB