$$\frac{3\log(10)}{3\theta} = \frac{3!}{5!} \frac{3!}{6!} + \frac{1-3!}{6!} = \frac{3!}{5!} \frac{3i-6}{6!(6)} = 0$$

$$\frac{3^2 \log L(0)}{50^2} = \frac{5 - \frac{20}{10^2} - \frac{1 - 20}{10 - 1}}{10 - 1} < 0$$

(a) 
$$E(x) = \int_0^\theta \frac{1}{\theta} \pi dx = \frac{1}{2}\theta$$
,

$$L(\theta, x_1 - x_n) = J(\frac{1}{\theta})^n$$
, if  $0 \le x_1 \le \theta$   
0 otherwise

$$=\frac{4}{n}\cdot\frac{9}{12}=\frac{9}{3n}$$

then we have fine  $\stackrel{P}{\Rightarrow} \theta$ . consistent.  $\checkmark$ 

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(d) 
$$F_{x(n)}(x) = P(x(n) \in x) = P(x_1 \le x, x_2 \in x - - x_n \in x)$$

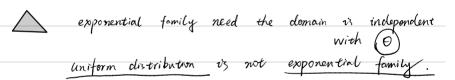
= 
$$P(x \in \infty)^n = (\frac{8}{6})^n$$
, if  $n \in [0, \theta]$ ,  $\theta > 0$ 

$$\Rightarrow \quad \left\{ \chi_{(n)}(n) = n \cdot \left(\frac{n}{\theta}\right)^{n-1} \cdot \stackrel{!}{\theta} , \quad \text{if} \quad n \in \mathbb{C}^{0}, \; \theta \right\}, \quad 0 \text{ otherwise}.$$

(e) 
$$\frac{f(x_{(1)};\theta) - f(x_{(n)};\theta)}{f(x_{(n)};\theta)} = \frac{(\overline{b})^n}{n(\overline{b})^{n-1} \cdot \overline{b}} = \frac{1}{n \cdot x_{(n)}}$$

independent with  $\theta$ .

nt is sufficient for 0



3. Gamma distribution:  $f_{x(x)} = \frac{1}{\Gamma(x) \cdot \beta^2} \cdot x^{2-1} \cdot e^{-x/\beta}$ , x70

(b) log L (0; x, - xn) = = log 1/15) -5log 0 + 4log 20; - 20;

$$\frac{\partial \log L(\theta)}{\partial \theta} = \sum_{i=1}^{n} -\frac{5}{\theta} + \frac{x_i}{\theta^2} , \quad \widehat{\Theta}_{MLE} = \frac{1}{5} \widehat{X}$$

we find  $\sum_{i=1}^{n} -50 + \infty$ ; maximizer is  $\pm x$ .

(c) 
$$T(\theta) = -E\left(\frac{365}{350^3 \text{ (x/6)}}\right)$$

R-c Gover bound = 
$$\frac{1}{n1(0)} = \frac{1}{n \cdot \delta r} = \frac{1}{sn \cdot \theta^2} = Var(\hat{\Theta}_{ME})$$

efficient.

$$P_{\times}(x) = \Theta^{x}(1-\theta)^{1-x}$$
,  $x=0$ ,

$$= \begin{cases} \Theta & \text{if } \infty = 1 \\ 1 - \Theta & \text{if } \infty = 0 \end{cases}$$

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I is Unique MVUE of O.

o expo ?

5. (a) reject to if Y= Exi < c

Y 0'= 1, 0" < 1

 $\frac{\sum (\Theta')}{\sum (\Theta'')} = \frac{\prod\limits_{i=1}^{N} \Theta'^{(N)} (1-\Theta')^{l-Ni}}{\prod\limits_{i=1}^{N} \Theta'^{(N)} (1-\Theta'')^{l-Ni}} = (\frac{\Theta'}{\Theta''})^{\sum Ni} \cdot (\frac{l-\Theta'}{l-\Theta''})^{4-\sum Ni}$ 

 $= \left(\frac{1-\theta'}{1-\theta''}\right)^{\frac{1}{2}} \cdot \left(\frac{\theta'}{\theta''} \cdot \frac{1-\theta''}{1-\theta'}\right)^{\frac{5}{2}20i} \leq k$ 

0" 1-0" 7

与发彩

we find Exisc is the critical region in UMP test.

2= P( = x = c | 0= 1)

(b) £xi ~ Binomial (4, 0)

 $P_{\text{EX}}(x) = \left(\frac{4}{x}\right) \theta^{x} (1-\theta)^{4-x}$ 

2= P( = 1 50 | 0= 1) = (=) 4

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