[redacted]

[redacted] $f_\theta(x_i) = e^{-(x_i-\theta)}$ if $\theta < x_i < \infty$

$$f_\theta(x_i) = e^{-(x_i-\theta)} I_{(\theta,\infty)}(x_i)$$

(a) $L(\theta) = \prod_{i=1}^{n} e^{-(x_i-\theta)} I_{(\theta,\infty)}(x_i)$

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s.t. $I_\theta(x_i) = \begin{cases} 1 & \text{if } \theta < x_i < \infty \\ 0 & \text{o/w} \end{cases}$

$$L(\theta) = e^{-\Sigma x_i + n\theta} I_{(\theta,\infty)}(x_{(1)})$$

$$= \underbrace{e^{-\Sigma x_i}}_{h(x)} \underbrace{e^{n\theta} I_{(\theta,\infty)}(x_{(1)})}_{g_\theta(T(x))}$$

$\Rightarrow$ By Factorization th^m $T(x) = X_{(1)}$ is suff. for θ

To get MSS.

$$\frac{f_\theta(\underset{\sim}{x})}{f_\theta(\underset{\sim}{y})} = \frac{e^{-\Sigma x_i} e^{n\theta} I_{(\theta,\infty)}(x_{(1)})}{e^{-\Sigma y_i} e^{n\theta} I_{(\theta,\infty)}(y_{(1)})}$$

$$= e^{-(\Sigma x_i - \Sigma y_i)} \frac{I_{(\theta,\infty)}(x_{(1)})}{I_{(\theta,\infty)}(y_{(1)})}$$

Now, this ratio does not depend on θ iff $X_{(1)} = Y_{(1)}$

Thus, $T(X) = X_{(1)}$ is MSS for θ.

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