Scribe

2) $\frac{1}{\theta^2} x e^{-\frac{x}{\theta}}$

$$L(\theta) = \prod_{i=1}^{n} \frac{1}{\theta^2} x_i e^{-\frac{x_i}{\theta}} = \left(\frac{1}{\theta^2} x_i e^{-\frac{x_1}{\theta}}\right)\left(\frac{1}{\theta^2} x_2 e^{-\frac{x_2}{\theta}}\right) \dots \left(\frac{1}{\theta^2} \dots\right)$$

$$= \frac{1}{\theta^{2n}} \cdot \prod_{i=1}^{n} x_i \cdot e^{-\frac{1}{n\theta}\sum x_i}$$

$$l(\theta) = \ln\left(\frac{1}{\theta^{2n}} \cdot \prod_{i=1}^{n} x_i \cdot e^{-\frac{1}{n\theta}\sum x_i}\right) = \ln\left(\frac{1}{\theta^{2n}}\right) + \ln\left(\prod_{i=1}^{n} x_i\right) + \ln\left(e^{-\frac{1}{n\theta}\sum x_i}\right)$$

$$= \ln(1) - \ln(\theta^{2n}) + \sum_{i=1}^{n} \ln(x_i) + \left(-\frac{1}{n\theta} \sum_{i=1}^{n} x_i \cdot \ln(e)\right)$$

$$-2n \cdot \ln(\theta) + \sum_{i=1}^{n} \ln(x_i) - \frac{1}{n\theta} \cdot \sum_{i=1}^{n} x_i$$

$$\cdot \frac{\partial l(\theta)}{\partial \theta} = 0 \Rightarrow -\frac{2n}{\theta} + \frac{1}{n\theta^2} \cdot \sum_{i=1}^{n} x_i = 0 \Rightarrow \frac{1}{n\theta^2} \sum_{i=1}^{n} x_i = \frac{2n}{\theta}$$

$$\Rightarrow \frac{\theta}{n\theta^2} = \frac{2n}{\sum_{i=1}^{n} x_i} \Rightarrow \frac{1}{n\theta} = \frac{2n}{\sum_{i=1}^{n} x_i} \Rightarrow \frac{1}{n} = \frac{2n\theta}{\sum_{i=1}^{n} x_i} = \frac{\sum_{i=1}^{n} x_i}{2n^2} = \theta$$

$$\frac{\partial^2 \theta}{\partial \theta^2} \Rightarrow \frac{2n}{\theta^2} - \frac{2}{n\theta^3} \cdot \sum_{i=1}^{n} x_i < 0$$

$$\theta = \frac{20.87 + 13.74 + 5.24 + 2.76 + 4.87 + 2.66}{2.6^2} = 0,69\overline{2}$$