

$$k_{\theta} = \frac{1}{n} \sum y$$

$$\frac{\partial k_{\theta}}{\partial \theta} = y$$

$$k_{\theta} = y_{\theta} - y$$

$$k_{\theta} - y_{\theta} = -y$$

$$\theta = -\frac{y}{k_{\theta} - y}$$

Using likelihood:

$$\prod_{i=1}^n \theta k_{\theta} \left( \frac{1}{y_i} \right)^{\theta+1} = \left( \theta k_{\theta} \left( \frac{1}{y_1} \right)^{\theta+1} \right) \cdots \left( \theta k_{\theta} \left( \frac{1}{y_n} \right)^{\theta+1} \right)$$

$$L(\theta) = \theta^n k_{\theta}^n \left( \frac{1}{\prod y_i} \right)^{\theta+1}$$

$$\ln L(\theta) = n \ln \theta + n \ln k_{\theta} - (\theta+1) \ln \prod y_i$$

$$= n \ln \theta + n \ln k_{\theta} - \theta \ln \prod y_i - \ln \prod y_i$$

$$\frac{d}{d\theta} \ln L(\theta) = \frac{n}{\theta} + n \ln k_{\theta} - \ln \prod y_i$$

$$0 = \frac{n}{\theta} + n \ln k_{\theta} - \ln \prod y_i$$

$$\frac{n}{\theta} = \ln \prod y_i - n \ln k_{\theta}$$

$$\theta = \frac{\ln \prod y_i - n \ln k_{\theta}}{n}$$

There are assumptions b/c  $\frac{\partial}{\partial y} k_{\theta} \neq \frac{\ln \prod y_i - n \ln k_{\theta}}{n}$