4.2) * Did in class

$$f(y \mid k, \mu) = \frac{1}{\Gamma(k)} \left(\frac{k}{\mu}\right)^{k} y^{k-1} e^{-\frac{ky}{\mu}}$$

$$\exp\left[k \log k - k \log(\mu) + (k-1) \log y - \frac{ky}{\mu}\right]$$

$$\theta = -\frac{1}{\mu} \qquad \phi = \frac{1}{k}$$

$$b(\theta_i) = -\log(\mu) = -\log\left(-\frac{1}{\theta}\right) = -\log(\theta)$$

$$b'(\theta_i) = -\frac{1}{\theta} = \mu$$

↳ useful when $y \in \mathbb{R}^+$ and skewed

4.3)

$$(*)$$

$$f(y \mid v) = \left(\frac{\Gamma\left(\frac{v+1}{2}\right)}{\sqrt{\pi v}\ \Gamma\left(\frac{v}{2}\right)} \right) \left(1 + \frac{y^2}{v}\right)^{-\frac{(v+1)}{2}}$$

$$= \exp\left[\underbrace{-\frac{v+1}{2} \cdot \log\left(1 + \frac{y^2}{v}\right)} + \log(*) \right]$$

No y term

Impossible to rewrite this as

$$y \cdot \theta \quad \text{for some function of } v$$

∴ Cannot be exponential dispersion family