



$$\left(\bar{w}_k^T \bar{x}, \dots, \bar{w}_k^T \bar{x} \right) \xrightarrow{\text{softmax}} \left(\dots, \frac{e^{\bar{w}_k^T \bar{x}}}{\sum_l e^{\bar{w}_l^T \bar{x}}}, \dots \right)$$

$$p(\bar{x}|\bar{\theta}) = h(\bar{x}) e^{\underbrace{\bar{\eta}(\bar{\theta})^T \bar{t}(\bar{x})}_{\text{s.t.}} - \underbrace{a(\bar{\theta})}_{\text{conjugate}}}$$

$$\bar{\theta}' = \bar{\eta}(\bar{\theta})$$

$$a(\bar{\eta}^{-1}(\bar{\theta}'))$$

$$p(\bar{x}|\bar{\theta}) = h(\bar{x}) e^{\bar{\theta}^T \bar{t}(\bar{x}) - a(\bar{\theta})} \Rightarrow E[\bar{t}(\bar{x})] = \nabla_{\bar{\theta}} a(\bar{\theta})$$

$$\theta = \log \frac{p}{1-p} \quad - \text{Bernoulli}$$

$$\bar{\theta} = \begin{pmatrix} \tau \\ \mu\tau \end{pmatrix} \quad - \text{Gaussian}$$