# Problem Set #1

## 3. Poisson Regression

(b)

Canonical response function for poisson regression family → Giving the distribution's mean as a function of the natural parameter.

$$p(y;\lambda) = \frac{e^{-\lambda}\lambda^{y}}{y!}$$

$$\eta = \log \lambda$$

$$g(\eta) = \lambda \leftarrow \text{mean (= variance of poisson distribution)}$$

$$g(\log \lambda) = \eta$$

$$g(\eta) = e^{\eta}$$

$$\therefore h_\theta(x) = E(y|x;\theta) = \lambda = e^{\eta} = e^{\theta^T x}$$