

BST 760: Advanced Regression
Breheeny

Assignment 6

Due: Thursday, March 24

1. Consider the gamma distribution, which has support on $[0, \infty)$:

$$f(y|\alpha, \beta) = \frac{\beta^\alpha}{\Gamma(\alpha)} y^{\alpha-1} e^{-\beta y},$$

with mean α/β and variance α/β^2 .

- (a) Reparameterize the gamma distribution in terms of μ .
- (b) Show that the gamma distribution belongs to the exponential family.
- (c) What is θ , as a function of μ ?
- (d) What is $b(\theta)$?
- (e) What is ϕ ?
- (f) What is $c(y, \phi)$?
- (g) Find $b'(\theta)$.
- (h) Write down the score statistic.
- (j) Find $b''(\theta)$.
- (k) Show how $\text{Var}(y)$ can be written as $\phi V(\mu)$.
- (l) What is the information for an observation from the gamma distribution?
- (m) What is the canonical link for the gamma distribution?