Stat 210B: Homework Assignment 1

Due: Wednesday Jan 22

1. Gamma $G(\lambda, \alpha)$ distribution has density

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

for $y > 0$. Let $\lambda = \alpha/\mu$ so that $E(Y) = \mu$ and $Var(Y) = \mu^2/\alpha$. Let the canonical parameter $\theta = -1/\mu$. Find dispersion parameter ϕ, the canonical link function $\eta = g(\mu)$, and variance function $V(\mu)$.

2. For the clot data in library(faraway), fit the following GLM model and get the estimates and standard errors.

```
> data(clot)
> g <- glm(time ~ log(conc)*lot, family=Gamma, data=clot)
> summary(g)
```

3. Use the fitting procedure in section 1.6 to reproduce the estimates and standard errors. Show the procedure.

4. What is the relationship between the estimated dispersion parameter $\hat{\phi}$ and the estimated variance $\hat{\sigma}^2$?