Hints on 18.466 PS6 due Friday, March 21

1 = 2.6.1. Write the definition of the gamma family of densities with a notation change in the scale parameter, for example ζ instead of λ, giving $f_{\zeta,a}(x)$.

2 = 2.6.8. (a) A probability density has a unique normalizing constant, so once you have found the functional form of the density, the constant is determined.

(b) Recall that $\Gamma(a+1) = a\Gamma(a)$ for any $a > 0$.

3 = 2.7.1. If $b < 0$ show that bx is worse than the constant 0 as an estimator of μ. If $b > 1$ show that bx is worse than x.

4 = 3.1.1. Writing the Poisson family as exponential, with $e^{-\lambda}\lambda^k = e^{-\lambda + k \ln \lambda}$, we see that $\theta = \ln \lambda$, so $\lambda = 0$ doesn't correspond to a point of the natural parameter space ($\theta \to -\infty$). A maximum of the likelihood function expressed in terms of λ, however, can occur for $0 < \lambda < \infty$ or for $\lambda = 0$.

In part (b), "MLE exists" means with $0 < \lambda < \infty$, in other words, $-\infty < \theta < \infty$.

5 = 3.2.1. Of the two roots of (3.2.12), only one gives the correct answer. The text says how to pick the right one.