HW2 **Stat 312**

1. Consider a random sample $X_1\, X_2\,, ..., X_n$ of size n when the population has a

   (a) Poisson(λ) distribution: $f(x, ; \lambda) = \frac{\lambda^x}{x!} e^{-\lambda}$ for $x = 0, 1, ...$ where $0 < \lambda < \infty$.

   (b) Gamma $(2, \theta)$ distribution: $f(x, ; \theta) = \frac{1}{\theta^2}\, x\, e^{-x\,/\,\theta}$ for $0 < x$ where $0 < \theta < \infty$.

   (c) Normal$(\mu_0\,, \sigma^2)$ where the mean μ_0 is known.

   (d) Geometric(p) distribution: $f(x, ; p) = (1-p)^{x\,-\,1}\, p$ for $x = 1, 2, ...$ where $0 < p < 1$.

   In each case, use the factorization result to obtain a sufficient statistic.

2. Referring to parts (a)-(c) of Problem 1, in each case obtain a unbiased estimator of the unknown parameter that is a function of the sufficient statistic.

   $$[\ \text{Hint for part (b): } k! = \int_0^\infty z^k\, e^{-z}\, d\,z \quad]$$

The last three problems are from the text.

3. Problem 1 (a) but also estimate the standard error, (b) and (c), Page 265

4. Problem 2 (a) but also estimate the standard error, Page 266

5. Problem 6 , Page 267