Stat 452 Fall 2011
Assignment #3

This assignment is due at the beginning of class on Wednesday, November 2, 2011.

1. Recall question 6 on Assignment #2. Let $X_1, X_2, \ldots, X_n$ be iid with the geometric distribution
$$P_\theta(X = x) = \theta(1 - \theta)^{x-1}, \quad x = 1, 2, \ldots, \quad 0 < \theta < 1.$$
Show that
$$\sum_{i=1}^{n} X_i$$
is sufficient for θ and find the family of distributions of this statistic. **Is the family complete?**

2. Exercise 6.18 page 302

3. Exercise 6.19 page 302

4. Exercise 7.1 page 355

5. Exercise 7.6 page 355

6. Exercise 7.7 page 355

7. Exercise 7.22 page 358

8. Exercise 7.24 page 359

9. Let X_1 and X_2 be iid random variables with density function given by
$$f(x|\theta) = \theta e^{-\theta x} I(x > 0)$$
for $\theta \in \Theta = (0, \infty)$.

  (a) Is the family of distributions of (X_1, X_2) an exponential family? Justify your answer.

  (b) Use Basu's Theorem to show that $X_1 + X_2$ and X_1/X_2 are independent for all $\theta \in \Theta$.

10. Exercise 6.21 (a) and (b) page 302

11. Exercise 6.40 page 306