King Saud University	Stat 621 (Statistical Inference-I)
College of Science	First semester, 1431-1432: Assignment 2
Department of Statistics and OR	Due date: 25/11/1431

Answer the Following Questions:

1. Let $x_1, x_2, \ldots, x_n$ is a random sample drawn from Weibull
$$f(x;\alpha,c) = \frac{c}{\alpha}\left(\frac{x}{\alpha}\right)^{c-1} \exp\left[-\left(\frac{x}{\alpha}\right)^{c}\right], \quad x > 0,\ \alpha, c > 0.$$
Find the MMEs and MLEs of α and c based on 100 random samples generated from different choices of the parameters and $n = 20, 30, 50$. Calculate the Bais and MSE in each case.

2. $x_1, x_2, \ldots, x_n$ is a random sample drawn from $f(x;\theta)$, show that the MLE of θ is a sufficient statistic.

3. Let $X_{1:n} \le X_{2:n} \le \ldots \le X_{r:n}$ be Type-II censored sample from the exponential distribution
$$f(x) = \frac{1}{\theta}\exp\{-x/\theta\}, x \ge 0.$$
   (a) Find the MLE of θ.
   (b) Discuss the unbiasedness, sufficiency and consistency of the MLE of θ.

4. Let $X_1, X_2, \ldots, X_n$ be a random sample of size n drawn from the exponential distribution
$$f(x) = \exp\{-(x-\theta)\}, \quad x \ge \theta.$$
   (a) Find the MLE and MME of θ and discuss the unbiasedness.
   (b) Prove that the statistics $T = min(X_1, X_2, \ldots, X_n)$ is complete.

5. Find Fisher information $I(\theta)$ for the following distributions:
   - $N(\mu, \theta^2)$
   - $Gamma(\lambda, \theta^2)$
   - $Binomial(n, \theta)$
   - $Possion(\theta)$

6. Let $X_1, X_2, \ldots, X_n$ be a random sample from $Beta(2, 1/\theta)$. Show that $\sum_{i=1}^{n} x_i$ is a complete sufficient statistic of θ.

7. Exercises (6.5) page 300 in Casella and Berger (2002) problems: (6.9) and (6.22).