

STATISTICS APPLIED TO BUSINESS ADMINISTRATION
ACADEMIC YEAR 2014-2015
PRACTICAL EXERCISES 4 AND 5 (25 MINUTES)

Date: _____

Complete name: _____ ID number: _____

EXERCISE 1 (10 POINTS)

Let X be a r.v. with probability density function given by

$$f(x, \theta) = \begin{cases} (\theta + 1) x^{-(\theta+2)} & \text{for } x > 1, \theta > 0; \\ 0 & \text{otherwise} \end{cases}$$

In order to estimate the parameter θ , a random sample of size n , X_1, X_2, \dots, X_n , is taken.

1. **(5 points)** Find, providing all relevant details, the maximum likelihood estimator, $\hat{\theta}_{ML}$, for the parameter θ .
2. **(5 points)** Find, providing all relevant details, the method of moments estimator, $\hat{\theta}_{MM}$, for the parameter θ .

EXERCISE 2 (10 POINTS)

Let X_1, X_2, \dots, X_n be a r.s. taken from a population that follows a Poisson, $\mathcal{P}(\lambda)$, distribution. Let us consider the following two estimators for the parameter λ :

$$\hat{\lambda}_1 = \frac{X_1 + X_2 + \dots + X_n}{n + 2}$$

$$\hat{\lambda}_2 = \frac{X_1 + 2X_2 + \dots + 2X_{n-1} + X_n}{2(n - 1)}$$

1. **(5 points)** Find out if either one or both of these estimators are unbiased. In addition, you should compute the bias for each of these estimators.
2. **(5 points)** Find out if either one or both of these estimators are consistent. In addition, you should compute the variance for each of these estimators, providing all relevant details.