

Quiz 5: Mathematical Statistics (MATH-UA 234)

In-class 11/08 (15min). Print your name and NetID, write in the box, and

circle your final answer

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Name: _____

NetID:

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Problem 1. For some fixed but unknown parameter $\alpha > 0$, suppose we get data $X_1, \dots, X_n \sim \text{Pareto}(1, \alpha)$. Recall the CDF for a Pareto random variable with parameters $(1, \alpha)$ is

$$F_\alpha(x) = \begin{cases} 1 - \frac{1}{x^\alpha} & x \geq 1 \\ 0 & x < 1 \end{cases}.$$

- (a) Find the PDF, $f_\alpha(x)$. (3 pts)
- (b) Write the likelihood function $L_n(\alpha) = \prod_{i=1}^n f_\alpha(X_i)$ and the log-likelihood function $\ell_n(\alpha) = \ln(L_n(\alpha))$. (6 pts)
- (c) Find the maximum likelihood estimator $\hat{\alpha}_n$ for α . (6 pts)

