

Quiz 2: Mathematical Statistics (MATH-UA 234)

In-class 09/27 (15min). Print your name and NetID and leave space at the edge of the page.

Name: _____

NetID:

Problem 1. Suppose $X \sim \text{Pareto}(\alpha)$ for some $\alpha > 0$. That is, suppose X has cumulative distribution function

$$F_X(t) = \mathbb{P}[X \leq t] = \begin{cases} 1 - t^{-\alpha} & t \geq 1 \\ 0 & t < 1 \end{cases}.$$

(a) Compute the probability density function $f_X(t)$. (5pts)

(b) Suppose $\alpha = 3$. Compute $\mathbb{E}[X^2]$. (5pts)

Problem 2. Suppose X and Y are random variables with joint probability mass function,

$$f_{X,Y}(x,y) = \mathbb{P}[X = x, Y = y] = \begin{cases} .1 & X = -2, Y = 1 \\ .3 & X = -1, Y = 1 \\ .2 & X = 1, Y = 1 \\ .1 & X = 3, Y = 2 \\ .3 & X = 1, Y = -1 \end{cases}.$$

Compute $\mathbb{E}[X|Y = 1]$. (hint: recall $\mathbb{P}[A|B] = \mathbb{P}[A \cap B]/\mathbb{P}[B]$) (5pts)