

MSAI Probability Seminar 10 Practice Problems

Problem 1. Compute the moment-generating function of $Geom(p)$. Use it to find expectation and variance.

Problem 2. Let X and Y be i.i.d. $Geom(p)$, and $N = X + Y$. Find the joint PMF of X, Y, N . Find the joint PMF of X and N . Find the conditional PMF of X given $N = n$

Problem 3. Let $U \sim U[0, \frac{\pi}{2}]$. Find the PDF of $\sin(U)$.

Problem 4. Let X and Y be i.i.d. $Exp(\lambda)$, and $T = \log(X/Y)$. Find the CDF and PDF of T .