HOMEWORK#1

Due on 5PM Dec 24

Please email your homework (scanned handwritten solution or typed solution) to my email address qfsong@purdue.edu with subject "HW 1 of NCKU course"

1. Let X be a uniform discrete random variable with probability mass function $Pr(X = i/n) = 1/n$ for $i = 1, 2, \ldots, n$. Let $Y = \log X$. What is the PMF for random variable Y.

2. Let X be a uniform random variable with probability desity function $f_X(t) = 1$ for $t \in [0, 1]$. Let $Y = \log X$. What is the PDF for random variable Y. Please follow the below steps:

   - What is the cumulative distribution function of X: $F_X(t) = Pr(X \leq t) =$?
   - What is the cumulative distribution function of Y: $F_Y(t) = Pr(Y \leq t) = Pr(\log X \leq t) = Pr(X \leq \exp t) =$?
   - What is the PDF of Y $f_Y(t) = F'_Y(t) =$?

3. Suppose someone is flipping a coin for indefinite number of times. Every time, with probability p, one gets a head, with probability $1 - p$, one gets a tail. Let Y be the number of flips needed to have the first head. What is the PMF for Y