

Assignment 6, PME, 4th Semester, Spring

Deadline: Before the final exam paper of PME

Assignment should be hand written.

Write your name, registration No. and section; else your assignment may not be marked.

Copying is not allowed.

Properly staple your pages (binding is not required).

1. A random variable X has pdf:

$$f_X(x) = \begin{cases} c(1 - x^2) & -1 \leq x \leq 1 \\ 0 & \text{elsewhere} \end{cases}$$

- a. Find c and plot the pdf.
 - b. Plot the cdf of X .
 - c. Find $P[X = 0]$, $P[0 < X < 0.5]$ and $P[|X - 0.5| < 0.25]$.
2. Find the characteristic function of the continuous uniform random variable X in $[-b, b]$. Find the mean and variance of X by applying the moment theorem.
3. Find the characteristic function of the geometric random variable X . Find the mean and variance of X by applying the moment theorem.
4. Find the probability generating function of the geometric random variable X . Find the mean and variance of X using the probability generating function.
5. An urn contains 16 balls: 4 balls are labeled “1”, 4 are labeled “2”, 2 are labeled “3”, 2 are labeled “4”, and the remaining balls are labeled “5”, “6”, “7”, and “8.” One ball is drawn from the urn at random and the number is noted as random variable X . Find the entropy of X .
6. Let X be the outcome of the toss of a fair dice.
- a. Find the entropy of X .
 - b. Suppose you are told that X is even. What would the reduction in entropy?