Student Name:

Homework # 4

Instructions: Prepare your deliverables in clean letter size printer-quality papers with a high-contrast pencil (engineering pads are also accepted). Attach this assignment sheet as cover page, show all your work, and box all your solutions. All Matlab code needs to be published, and all figures needs to have proper axis labeling and legends. Homework assignments will be collected during class time on the due date. *No late homework or submission that do not strictly follow the provided instructions will not be accepted.*

- **Homework problems not to be graded**
  - From textbook:
    - Ch 3: 3.5, 3.6, 3.7, 4.2

- **Homework problems to be graded**

1) Balls are drawn from a bag, where each ball is equally likely to be red or green.
   a. If you randomly grab four balls, what is the probability that you grab an equal number of red and green balls?
   b. Let G be the number of green balls in 64 randomly chosen balls. What is the PMF of G?
   c. Let R be the number of balls you draw before drawing the first red ball. What is the PMF of R?

2) Suppose each day starting from day 1 you buy a lottery ticket with probability 1/2; otherwise, you buy no tickets. A ticket is a winner with probability of p independent of the outcome of all other tickets. Define the following events:
   $N_i = \{$"you do not buy a ticket on day i"$\}$
   $W_i = \{$"you buy a winning ticket on day i"$\}$
   $L_i = \{$"you buy a losing ticket on day i"$\}$

   a. Let K be the number of the day you buy your first ticket. Find the PMF of K.
   b. Let R be the number of losing lottery tickets you purchased in m days. Find the PMF of R.
   c. Let D be the number of the day on which you buy your jth losing ticket. Find the PMF of D.