

Answer the following problems completely given the context. Show all your work.

1. For each of the following situations to model, (i) define a discrete random variable and (ii) declare the sample space for the random variable.

Let X be a discrete random variable representing some quantification of the uncertainty, and let Ω denote the sample space of X .

Ex. analyze the number of goals allowed by the ISU hockey team during their next game.

Answer: X = number of goals allowed by ISU in a their next game. $\Omega = \{0, 1, 2, 3, \dots\}$ (i.e., \mathbb{N}_0).

- (a) the number of bowling games needed for you to have at least 100 points
 - (b) analyze how many accidents occur at the intersection of Lincoln Way & Welch Ave. during any week
 - (c) you play a game where you roll a 6-sided die and win a number of points equal to 3 divided by your roll
2. Five balls, numbered 1, 3, 5, 7, and 9 are placed in an urn. Two balls are randomly selected from the five (without replacement), and their numbers noted. Find the probability distribution for the following:
 - (a) The *largest* of the two sampled numbers.
 - (b) The *average* of the two sampled numbers.
 3. Calculate the cumulative probability function for the valid probability mass function

$$P(x) = \begin{cases} \frac{x}{10} & x = 1, 2, 3, 4 \\ 0 & \text{any other } x \end{cases}$$

Carefully plot the cumulative probability function for X , $F(x)$, labeling all axes.

4. Baron 3.2. p. 68. (The answers are in the back of the book, so showing your work here is very important!)
5. Calculate the mean, variance, and standard deviation of the discrete probability distribution in question 3.
6. A single fair die is tossed once. Let Y be the number facing up. Find the expected value and variance of Y .