Random Variables

Exercise 1.

Define the space and calculate the probabilities for the variable that measures the probability of getting

tails when flipping two coins.

Answer:

X	0	1	2
P(X)	0.25	0.50	0.25

Exercise 2.

Let X be a random variable:

X	0	2	5	6	10
P(X)	1/30	3/30	12/30	8/30	6/30

Calculate the expected value and the standard deviation of Z if Z = 2X – 20.

Answer: E(Z) = -8.4. Var(X) = 6.36. Var(Z) = 25.44

Exercise 3.

The following probability distribution represents the number of seasons of the year in which snows in

Ireland:

X	0	1	2	3	4
P(X)		0.25	0.40		0.05

It is also known that the average number of seasons in which snows in Ireland is 2.

a) Complete the table.

Answer: P (X = 0) = 0.05. P(X=3) = 0.25.

b) Calculate the standard deviation.

Answer: 0.9486 seasons.

Exercise 4.

The number of defective objects in a box of 4 I represented by the following table:

X	0	1	2	3	4
P(X)	0.80	0.10	0.05	0.03	0.02

a) How many items we expect to be defective? *Answer: 0.37*

b) Calculate the standard deviation of X. *Answer: SD = 0.8678*

b) Suppose that the loss of the company is represented by Y = 20X, what represents 20 in this case?

Answer: The company loses 20 euros per defective object.

Exercise 5.

The department of investment in a company is planning to proceed with a new project but there are two possibilities: Project I and Project II. It is expected to have the same return of investment, but the feasibility of maintaining the project along the time depends on the volatility which is measured by the dispersion of the data (greater dispersion, greater risk). Decide what project is more convenient in terms of risk?

Project 1

Money	1,200	2,800	1,000	3,000	2,000
Probability	0.05	0.15	0.25	0.35	0.20

Project 1

Money	1,700	1,200	3,100	1,500	2,500
Probability	0.10	0.15	0.18	0.30	0.27

Answer: Dispersion project I = 38.26%. Dispersion project II = 33.51%. It is more convenient the project 2.

Exercise 6.

Define what of the following variables are discrete and what are continuous?

   a)   Number of siblings of a person.

   b)   Weight of a bag of coffee.

   c)   Height of a group of students.

   d)   A group of students.

   e)   Age of a person.

   f)   Biscuits in a bag.

   g)   Oil paint in a tube.

   h)   Temperature in Russia in winter.

   i)   Number of cars passing by per hour.

Answers:

   a)   *Number of siblings of a person. DESCRETE*

   b)   *Weight of a bag of coffee. CONTINOUS*

   c)   *Height of a group of students. CONTINOUS*

   d)   *A group of students. DISCRETE*

   e)   *Age of a person. CONTINUOUS*

   f)   *Biscuits in a bag. DISCRETE*

   g)   *Oil paint in a tube. CONTINUOUS*

   h)   *Temperature in Russia in winter. CONTINUOUS*

   i)   *Number of cars passing by per hour. DISCRETE*

Additional exercises to practice:

https://stats.libretexts.org/Bookshelves/Introductory_Statistics/Book%3A_Introductory_Statistics_(Shafer_and_Zhang)/04%3A_Discrete_Random_Variables/4.E%3A_Discrete_Random_Variables_(Exercises)