CHAPTER 6

Random pairs

This chapter is devoted to an introduction to the study of probability law s of random pairs (X, Y), ***i.e.*** two-dimensional random vectors, their usual parameters and related concepts. Its follows the lines of Chapters 4 and 5 which focused on real-valued random variables. As in the aforementioned chapter, here again, we focus on discrete random pairs.

A discrete random pair (X, Y) takes its values in a set of the form

$$\mathcal{SV}_{(X,Y)} = \{(a_i, b_j), (i, j) \in K\},$$

where K is an enumerable set with

$$\forall (i, j) \in K,\ \mathbb{P}\Big((X, Y) = (a_i, b_j)\Big) > 0. \tag{0.1}$$

We say that $\mathcal{SV}_{(X,Y)}$ is a **strict** support or a domain or a values set of the random pair (X, Y), if and only if, all its elements are taken by (X, Y) with non-zero probabilities, as in (0.1).

We want the reader to remark for once that adding supplementary points (x, y) which are not taken by (X, Y) [meaning that $\mathbb{P}((X, Y) = (x, y)) = 0$] to $\mathcal{SV}_{(X,Y)}$, does not change anything regarding computations using the probability law of (X, Y). If we have such points in a values set, we call this latter an **extended values set**.

We consider the first projections of the pair values defined as follows:

$$(a_i, b_j) \hookrightarrow a_i.$$

By forming a set of these projections, we obtain a set

$$\mathcal{V}_X = \{x_h, h \in I\}.$$