1 Spatiul evenimentelor elementare (Sample Space)

$$\Omega = \{e_1, e_2, \ldots, e_n\}$$

$$\sum_{i=1}^{n} p_i = 1 \ (normalizare)$$

Exemplul 1. Aruncarea a 2 zaruri:

$$\Omega = \{\ (i,j) \mid i,j \in [1,6]\ \}$$

$$p(i,j) = \frac{1}{36} \ \ \forall\ (i,j) \in \Omega$$

Exemplul 2. Alegerea unui pivot aleator:

$$\Omega = \{1, 2, \ldots, n\}$$

$$p(i) = \frac{1}{n}$$

2 Eveniment (Event): $S \subseteq \Omega$

$$Pr(S) = \sum_{i \in S} p(i)$$

<u>Exemplul 1.</u> Aruncarea a 2 zaruri:

$$Pr(\ Suma\ celor\ 2\ zaruri\ = 7)\ = \frac{1}{6}\ (= 6\ \frac{1}{36})$$

$$\{\ (i, j)\ |\ i + j\ = 7\} = \{(1, 6),\ (2, 5),\ (3, 4), \ldots,\ (6, 1)\ \}$$

<u>Exemplul 2.</u>

$$Pr(\ pivotul\ ales\ da\ split\ 25\% - 75\%\ sau\ mai\ bun\ ) =\ \frac{1}{2}$$

3 Variabila aleatoare (v.a.) (Random Variable (r.v.))

$$Fie\ o\ functie\ X : \Omega - > \mathbb{R}$$

Exemplul 1: suma celor 2 zaruri

Exemplul 2: dimensiunea unui sub-vector pentru 1 apel recursiv

4 Media unei variabile aleatoare X

(Expectation of a random variable X)

$$Fie\ E[X] := \sum_{i \in \Omega} X(i)\ \cdot\ p(i)$$

<u>Exemplul 1.</u>

$$E[\ suma\ celor\ 2\ zaruri\ ] =\ 7$$

<u>Exemplul 2.</u>

$$E[\ dimensiunea\ sub-vectorului\ unui\ apel\ recursiv\ ] =$$

$$=\ 0,\ 1,\ \ldots,\ i,\ \ldots,\ n-1:\ valori$$

$$\frac{1}{n}, \frac{1}{n}, \ldots, \frac{1}{n}, \ldots, \frac{1}{n}:\ probabil$$

$$= \frac{1}{n} \sum_{i=0}^{n-1} i\ \ = \frac{1}{n}^{\backslash n} \cdot\ \frac{n\ (n-1)}{2}^{\backslash n}\ \ = \frac{n-1}{2}$$

5 Linearitatea mediei (Linearty of expectation)

$$Fie\ X_1,\ \dots,\ X_n\ :\ \Omega \to \mathbb{R},\ \ variabile\ aleatoare\ (\underline{Nu\ trebuie\ sa\ fie\ independente})$$

$$E[\sum_{i=1}^{n} X_i]\ =\ \sum_{i=1}^{n} E[X_i]$$

Exemplul:

$$X_1 = valoarea\ zarului\ 1$$

$$X_2 = valoarea\ zarului\ 2$$

$$E[X_i] = \frac{1}{6}\ (1\ +\ 2\ +\ 3\ +\ 4\ +\ 5\ +\ 6) = \frac{7}{2}$$

$$E[Suma] = E[X_1 + X_2] = \frac{7}{2}\ +\ \frac{7}{2}\ = 7$$