

## Chapter VI

### Parameters of a Random Variable

#### Exercises

##### 6. 1.

Let the random variable  $X$  have the probability function

$x_i$	-3	0	1	2	3
$P(X = x_i)$	0.1	0.15	0.1	0.25	0.4

Find

- the distribution function of  $X$ .
- $P(X > 0)$ .
- the expected value and the dispersion of  $X$ .

##### 6. 2.

An apparatus comprises 3 sensitive elements. Let  $p_i$ , ( $i = 1, 2, 3$ ), denote the probability that the  $i$ th element falls out.

Find the expected value of the number of elements that will fall out.

##### 6. 3.

Consider the function  $f$  with

$$f(x) = \begin{cases} \alpha x^2(1-x) & 0 \leq x \leq 1 \\ 0 & \text{otherwise} \end{cases}.$$

- For what value of  $\alpha$  will  $f$  be the density function of a random variable  $X$ ?
- Find the distribution function, the expected value and the dispersion of  $X$ .
- Determine  $P(X < \frac{1}{2})$  and  $P(X < E(X))$ .

##### 6. 4.

There is a lottery of 1000 tickets; every ticket costs 1 €. Lottery has the following prizes: one ticket wins 500 €, five tickets win 50 € and 20 tickets win 10 €.

Find

- the *expected return*  $ER$  (expected value of win).
- the *expected edge*  $EE$  (expected value of game results).

##### 6. 5.

Refer to the two-coin tossing experiment of exercise 5. 7. Find

- the mean
- the variance and the standard deviation

for the random variable  $X$ .

**6. 6.**

The number of trucks arriving hourly at a warehouse facility has been found to follow the probability distribution in the following table:

**Hourly Arrival of Trucks at a Warehouse**

Number of trucks ( $X$ )	0	1	2	3	4	5	6
Probability ( $P(X)$ )	0.05	0.10	0.15	0.25	0.30	0.10	0.05

Calculate

1. the expected number of arrivals per hour
2. the variance
3. the standard deviation

for the discrete random variable  $X$ .

**6. 7.**

The following table identifies the probability that a computer network will be inoperative for the indicated number of periods per week during the initial installation phase for the network:

**Number of Inoperative Periods per Week for a New Computer Network**

Number of periods ( $X$ )	4	5	6	7	8	9
Probability ( $P(X)$ )	0.01	0.08	0.29	0.42	0.14	0.06

Calculate

1. the expected number of times per week that the network is inoperative
2. the variance
3. the standard deviation

for this variable.

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