

# University of Djilali Bounaama - Khemis Miliana

Faculty of Economic, Commercial, and Management Sciences

Level: First Year (Branch 2)

Subject: Statistics 2

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## Exercise Series No. 3 (Random Variables)

**Exercise 1:** We consider a random experiment consisting of tossing a balanced die twice.

Let be  $X$  “the absolute difference between the two numbers obtained”.

**Required:**

1. Determine the **probability distribution table** of the random variable and represent it graphically.
2. Determine the **cumulative distribution function** of and represent it graphically.
3. Calculate the following probabilities:  $P(X > 2)$ ,  $P(X \geq 3)$
4. Calculate Expected value and Variance.

**Exercise 2:** Let be  $X$  a random variable with the following probability distribution:

$X=x_i$	$P(X=x_i)$
15	$1h$
25	$2h$
35	$3h$
45	$4h$
55	$5h$
65	$6h$

**Required:**

1. Find the value of “ $h$ ”.
2. Determine the **cumulative distribution function**  $F(x_i)$ .
3. Define a new variable such that:  $Y = (x-5)/10$ , find its value.
4. Determine the **probability distribution** and the **CDF** of new variable  $Y$ .
5. Compute:  $E(X)$ ,  $E(Y)$ ,  $V(X)$ ,  $V(Y)$

**Exercise 3:** The following table gives the probability distribution of the random variable  $X$  :

$X=x_i$	1	2	3	4	5
$P(X=x_i)$	$1/15$	$2/15$	$1/5$	$4/15$	$k$

**Required:**

1. Determine the value of  $k$ .
2. Calculate the following probabilities:  $P(1 < X \leq 4)$ ,  $P(2 \leq X < 5)$ ,  $P(X > 5)$ ,  $P(X \geq 5)$
- 3- calculate  $E(X)$ ,  $V(X)$