	Computer Sciences Dept.	Code: EXM-FR 01/1
	Make Up Midterm Exam (Fall 2023/2024)	ED:2.1
	MATH204–Probability and Statistics I	

Stu. Name:	**Inst. Name: Dr. Ayman El Zein**	**Booklet Needed: No**
ID Number:	**Section:**	**Exam Date:15/12/2023**

Exam Time: 1h 15 min	**Grade: ………..../100**

Exercise 1: (12 pts)

Eight students, including three brothers, want to be arranged in order.

a. In how many ways can they be arranged without any restriction?
b. Calculate the probability that the three brothers are consecutives in the arrangement.
c. Calculate the probability that one of the brothers will be the first one in the arrangement.

Exercise 2: (24 pts)

A box contains:

Five red cards numbered -1

Four blue cards numbered $-1, 0, 1, 1$

Three white cards numbered $0, 1, 2$

And, one green card numbered -2.

We draw simultaneously three cards from the box. Consider the following events:

A: "The three cards have the same color"

B: "The three cards have consecutive numbers"

C: "The sum of the three numbers is 2"

Calculate $P(A)$, $P(B)$, $P(C)$, $P(A \cup B)$, and $P(A \cup C)$.

Exercise 3: **(14 pts)**

We aim to make a committee of three out of ten persons. The committee is formed by a president, a vice president, and a spokesperson.

a. In how many ways can we make this committee?
b. A person says that he will be the president or he will not participate in the committee at all. In how many ways can we make this committee?
c. Two persons say that they don't want to be together in the committee. In how many ways can we make this committee?

Exercise 4: (16 pts)

Two independent events A and B are such that $P(A) = 0.2$ and $p(B) = 0.3$. A third event C is such that $P(C) = 0.5$ and $P(A \cup C) = 0.6$.

    a. Calculate $P(A \cup B)$.

    b. Are A and C independent? Justify.

    c. Calculate $P(C|\bar{A})$.

Exercise 5: (6 pts)

A die has the probability to obtain an even number the double of that to obtain an odd number. Find the probability to obtain 1 when rolled.

Exercise 6: (28 pts)

A. A box contains 8 dice, 3 of them are red and the remaining are blue. The faces of the blue dice are numbered from 1 to 6, while those of the red dice are numbered: $2, 5, 5, 5, 5, 5$. A player draws, simultaneously, two dice from the box. Consider the following events:

R: "The two drawn dice are red"

B: "The two drawn dice are blue"

T: "The two drawn dice are of different colors"

Calculate the probabilities $P(R)$, $P(B)$, and $P(T)$.

B. After drawing the dice as mentioned in part A, the player rolls them. Consider the following event:

D: "The two digits are the same"

a. Calculate $P(D|R)$ and deduce $P(D \cap R)$.

b. Calculate $P(D)$.

c. Knowing that the two digits are different, what is probability that the two drawn dice were of different colors?