



## Computer Sciences Dept.

### Midterm Exam (Fall/2023)

Code: EXM-FR 01/1  
ED:2.1

### Math 204 – Probability and Statistics I

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| Stu. Name: | Inst. Name: Dr. Soukaina Zayat | Booklet Needed: None  |
| ID Number: | Section: A                     | Exam Date: 20/11/2023 |

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| Exam Time: 1h 15 min | Grade: ...../100 |
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#### **Exercise 1:** (18 pts)

Suppose you are given three jars. Jar I contains one black and 4 white marbles, Jar II contains 4 black and 6 white marbles, and Jar III contains 3 black and 2 white marbles. One of the jars is selected at random and a marble is drawn from it.

- Construct a tree diagram to represent this scenario.
- What is the probability that the marble chosen is a black marble?
- Given that the chosen marble is black, what is the probability that it came from Jar II?

**Exercise 2:****(10 pts)**

I roll a die 18 times. What is the probability that each number appears exactly 3 times?

**Exercise 3:****(24 pts)**

Four red, 8 blue, and 5 green balls are randomly arranged in a line.

- a) What is the probability that the first 5 balls are blue?
- b) What is the probability that none of the first 5 balls are blue?
- c) What is the probability that the final 3 balls are differently colored.
- d) What is the probability that all the red balls are together?

**Exercise 4:** (20 pts)

A dance class consists of 22 students, of which 10 are women and 12 are men.

- a) In how many ways can 5 men and 5 women be chosen?
- b) Now consider a group of 5 men and 5 women. We want to distribute them into couples, such that each couple consists of a man and a woman. How many results are possible?
- c) If 5 men and 5 women are to be chosen and then paired off into couples of a man and a woman. According to parts a) and b), how many results are possible?

**Exercise 5:****(18 pts)**

Two events A and B are such that  $P(A) = 0.5$ ,  $P(B) = 0.3$ , and  $P(A \cap B) = 0.1$ .

Construct a venn diagram showing the sample space and the events A, B, and  $A \cap B$ , and then calculate

- (a)  $P(A|B)$ ;
- (b)  $P(A \cup B)$
- (c)  $P(A|A \cup B)$ ;
- (d)  $P(A|A \cap B)$ ;
- (e)  $P(A \cap B|A \cup B)$ .

**Exercise 6:** **(10 pts)**

Three cards are drawn in succession, without replacement, from an ordinary deck of playing cards. Find the probability that the first card is a red ace, the second card is a 10 or a jack, and the third card is a black card which is greater than 3 but less than 7.

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**Bonus Exercise:**

John and Bob take turns in flipping a fair coin. The first one to get a head wins. John starts the game. What is the probability that he wins?

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*Good Luck!!*