

 <p>USAL جامعة العلوم والآداب اللبنانية UNIVERSITY OF SCIENCES & ARTS IN LEBANON</p>	<p>Computer Sciences Dept.</p> <p>Midterm Exam (Fall/2023)</p> <p>Math 204 – Probability and Statistics I</p>	<p>Code: EXM-FR 01/1 ED:2.1</p>
<p>Stu. Name: ID Number:</p>	<p>Inst. Name: Dr. Soukaina Zayat Section: A</p>	<p>Booklet Needed: None Exam Date: 20/11/2023</p>
<p>Exam Time: 1h 15 min</p>		<p>Grade:/100</p>

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.

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?

Good Luck!!