OSTİM TEKNİK ÜNİVERSİTESİ
ANKARA

Faculty: Engineering
Department: .....
Course Code/Name: MAT 204 Probability and Statistics for Engineers
Instructor: .....

**Exam Paper**
**MIDTERM EXAM**
Date: 29/03/2026
Duration: 60 minutes

| Student ID | Full Name | Signature |
|---|---|---|
| | | |

| Questions | Q1 | Q2 | Q3 | Q4 | Q5 | TOTAL |
|---|---|---|---|---|---|---|
| Scores | /20 | /20 | /20 | /20 | /20 | /100 |

## EXAM RULES

**Please read the exam rules below carefully and follow them completely.**

- **Arrive on time:** Be present in the exam room before the exam begins.
- **Late entry:** Students may enter the exam only within the first fifteen (15) minutes.
- **Early exit:** No student may leave the room during the first thirty (30) minutes.
- **Bring your ID:** Keep your student ID card or an approved identification document with you.
- **Electronic devices are prohibited:** Calculators, phones, smart watches, earphones, and other unauthorized devices must be turned off and kept away from the desk unless explicitly permitted.
- **Unauthorized materials are prohibited:** Books, notes, papers, bags, and similar items must not be on or under the desk unless permission is given.
- **Follow instructions:** Obey all instructions given by the instructor and proctors.
- **Communication is prohibited:** Talking, signaling, or communicating with other students in any way is forbidden.
- **Exchanging materials is prohibited:** Do not borrow, lend, or exchange any materials unless permission is given.
- **Cheating is prohibited:** Cheating, attempting to cheat, or displaying suspicious behavior may result in disciplinary action.
- **Stop writing when time is over:** When the end of the exam is announced, stop writing immediately.
- **Submit all papers:** Hand in all papers and answer sheets before leaving the room.
- **Maintain silence and order:** Silence and proper conduct must be maintained throughout the exam.
- **Important:** Violation of these rules may result in the exam being declared invalid and/or disciplinary action.

**Student Declaration:** *I declare that I have read, understood, and agreed to comply with the exam rules stated above.*

**Full Name:** .....

**Signature:** .....

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**1)** A bag contains 5 red marbles and 3 blue marbles. If 2 marbles are drawn at random from the bag, which of the following is the probability that both marbles are red?

A. $\frac{3}{28}$
B. $\frac{5}{14}$
C. $\frac{10}{28}$
D. $\frac{15}{28}$

**Answer:** Sample answer: The correct option is the probability corresponding to choosing two red marbles by combination.

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**2)** A die is rolled twice. Which of the following statements is correct for the events "obtaining a number greater than 4 on the first roll" and "obtaining an even number on the second roll"?

A. The events are dependent because they belong to the same die.

B. The events are independent because they belong to different rolls.

C. The events are not independent because they do not intersect.

D. It cannot be determined; additional information is required.

**Answer:** Sample answer: The correct option is the one stating that the events occur on different rolls.

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**3)** There are 30 students in a class. Eighteen students have taken mathematics, and 12 students have taken physics. There are 6 students who have taken both courses. Find the probability that a randomly selected student has taken at least one of these courses.

**Answer:** Sample answer: Use the inclusion-exclusion principle to find the number of students who have taken at least one course, then divide by 30.

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**4)** In a factory, 3% of the products are defective. Which of the following expressions gives the probability that at least one of 10 randomly selected products is defective?

A. $(0.03)^{10}$

B. $1-(0.97)^{10}$

C. $1-(0.03)^{10}$

D. $(0.97)^{10}$

**Answer:** Sample answer: The correct option is obtained by subtracting the probability that all products are non-defective from 1.

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**5)** The probability density function of a continuous random variable is given by

$$f(x) = \begin{cases} cx^2, & 0 \le x \le 2, \\ 0, & \text{otherwise.} \end{cases}$$

Find the constant $c$ and the probability $P(1 \le X \le 2)$.

**Answer:** Sample answer: First find $c$ by setting the total probability equal to 1, then integrate over the required interval.