ITÜ FACULTY of COMPUTER and INFORMATICS ENGINEERING

ITU, Computer Engineering Dept
MAT271E, Probability and Statistics
Final Exam

Date: June 09 - 15:00
Duration: 25 minutes per question

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Teaching Assistant: Tolga Ok (okt@itu.edu.tr)

- **Solve the exam on your own.** You must complete the exam questions independently. Cheating, in any form, is **strictly prohibited** and can have serious consequences.
- **Late submissions will not be accepted**. Please do not email us your late submissions. You are expected to submit your solutions only through Ninova before the due date.
- Write out the solutions to each question on an A4 paper using an **unerasable pen**. Use at least one page per question and use only one side of the paper, and remember to include your name, ID, and signature on each paper. Merge the images of each paper in a pdf file with the correct rotation.
- **Show your work**. To get a good grade, make sure to include all the necessary steps in your solution. Displaying the intermediate steps instead of going directly to the conclusion is important.
- The final exam contributes **40%** to your overall grade.

Question 5 [20 pts]

Let X denotes the outcome of a 10 sided fair die roll.

a) Find the probability mass function (PMF) of the random variable $Y = (X + 1) \mod (4)$

b) Find the probability mass function (PMF) of the random variable $Y = 3 \mod (X)$

c) Let random variable Y denote the minimum outcome of rolling the same 10 sided die twice. Find the probability mass function (PMF) of the random variable Y.

The function $f_a(x) = x \mod (a)$ is the modulus function. For example: $f_5(3) = 3 \mod (5) = 3$, and $f_3(5) = 5 \mod (3) = 2$.