

YILDIZ TECHNICAL UNIVERSITY

FACULTY OF ELECTRICAL AND ELECTRONICS / DEPARTMENT OF COMPUTER ENGINEERING

BLM 2011: Probability and Statistics — Fall 2020

Quiz Exam 1

You are required to write your *name, surname, student number* and your *signature* on A4 white paper(s). Your solution papers will be these A4 paper(s) on which you do not need to rewrite the question on them. You will only write them your solutions for the question(s) given below.

On the day of the exam of Quiz 1, *the quiz solutions of those who are absent in the lecture will not be evaluated*. Thus, you are highly recommended to attend the lecture. Note that, within the scope of Quiz 1, you are required to upload your own solutions as a *single* PDF file. Your solutions should *be written in handwriting*. If your solutions are not handwritten, your submission will not be evaluated and you will not be able to get any points from your 1st Quiz. Also, it should not be forgotten that your solution will be evaluated and graded according to their very detailed, readable and understandable forms. Using the submission link that will be shared with you within Zoom chat, you have to *submit your solution until 15:59 on November 12, 2020*. Solutions submitted after this date will not be evaluated.

Your solutions that you upload *must be in PDF format*. Otherwise, your solution will not be evaluated. The name of the PDF file you uploaded must be in "studentno_Q1.pdf" format. For example, your filename will be similar to "19010101_Q1.pdf". Assignments whose PDF file name is in another format will not be evaluated. You need to upload a single PDF file. Solutions uploaded as PDFs with more than 1 piece will not be evaluated. Your solution uploaded either in image formats such as JPEG and PNG or compressed formats such as ZIP and RAR *will not be evaluated*.

Wish you success in your Quiz 1!

1. **[100 points]** Experiment A has three mutually exclusive possible outcomes $\{A_1, A_2, A_3\}$ and experiment B has two mutually exclusive possible outcomes $\{B_1, B_2\}$. The joint probabilities are

$$\Pr(A_1 \cap B_1) = 0.2 \quad \Pr(A_1 \cap B_2) = 0.1$$

$$\Pr(A_2 \cap B_1) = 0.1 \quad \Pr(A_2 \cap B_2) = 0.2$$

$$\Pr(A_3 \cap B_1) = 0.1 \quad \Pr(A_3 \cap B_2) = 0.3$$

Based on these joint probabilities, answer the following questions.

- Determine the probabilities $\Pr(A_1)$, $\Pr(A_2)$, and $\Pr(A_3)$
- Determine the probabilities $\Pr(B_1)$ and $\Pr(B_2)$.
- Determine the conditional probabilities $\Pr(A_1|B_1)$, $\Pr(A_2|B_1)$ and $\Pr(A_3|B_1)$.
- Determine the conditional probabilities $\Pr(A_1|A_1)$, $\Pr(A_2|A_1)$ and $\Pr(A_3|A_1)$.
- Show whether or not experiments A and B are independent of each other and prove your conclusion.