Name-Surname:
Student ID:
Signature:

26.05.2023

PROBABILITY & STATISTICS (MAT 271E) MIDTERM EXAM
Time : 75 min

Q1. 30 POINTS The following data represents the lifetimes (in hours) of a sample of 40 transistors:

112	121	126	108	141	104	136	134
121	118	143	116	108	121	127	140
113	117	126	130	134	120	131	133
118	125	151	147	137	140	132	119
110	124	132	152	135	130	136	128

(a) Construct a frequency table from the data above.

Lifetime	Frequency	Relative frequency (%)	Cumulative relative frequency

(b) Draw the histogram and frequency polygon.
(c) Calculate the sample mean, median and mode.

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Q2. 15 POINTS A consumer research organization has studied the services under warranty provided by the 50 new-car dealers in a certain city, and its findings are summarized in the following table.

	Good service under warranty	Poor service under warranty
In business 10 years or more	16	4
In business less 10 years	10	20

a) If a person randomly selects one of these new-car dealers, what is the probability that he gets one who provides good service under warranty?
b) If a person randomly selects one of these new-car dealers who have been in business for 10 years or more, what is the probability that he gets one who provides good service under warranty?
c) What is the probability that one of the dealers who have been in business less than 10 years will provide good service under warranty?

Q3. 15 POINTS In an automated filling operation, the probability of an incorrect fill when the process is operated at a low speed is 0.001. When the process is operated at a high speed, the probability of an incorrect fill is 0.01. Assume that 30% of the containers are filled when the process is operated at a high speed and the remainder are filled when the process is operated at low speed.
(a) What is the probability of an incorrectly filled container?
(b) If an incorrectly filled container is found, what is the probability that it was filled during high speed operation?

Q4. 20 POINTS The number of adults living in homes on a randomly selected city block is represented with random variable X and described by the following probability distribution.

Number of adults, X	1	2	3	4 or more
Probability, P(x)	0.25	0.50	0.15	???

What is the probability that 4 or more adults reside at a randomly selected home?
Calculate the E{X} and Var{X}?

Q5. 20 POINTS The number of flaws in a fibre optic cable follows a Poisson distribution. The average number of flaws in 50m of cable is 1.2.
(a) What is the probability of exactly 3 flaws in 150m of cable?
(b) What is the probability of at least 2 flaws in 100m of cable?
(**c)** What is the probability of exactly one flaw in the first 50m of cable and exactly one flaw in the second 50m of cable? The occurrence of flaws in the first and second 50m of cable are independent.

Good luck ☺
Prof. Dr. Canan SARIÇAM