Question I (4.5 points)

1. In 2023, at university A, 50% of students live in dormitory campus, 30% of students rent apartments or houses off-campus; 20% live in their own houses. For students living in dormitory campus, the percentage of students passing Maths exam is 70%. For renting apartments or houses off-campus, the percentage is 80%, whereas for living in their houses the percentage is 60%. If select randomly a student passed Maths exam, what is the probability that he lives in dormitory campus?

2. Let X (minute) denote the time to fully charge the 6 cell Li-ion battery of a Dell laptop. The pdf of X is
$$f(x) = \begin{cases} k\,x\,(x - 20) & , & 0 \le x \le 240 \quad ; \\ 0 & , & x < 0 \quad or \quad x > 240. \end{cases}$$
a/ Find the value of k.
b/ Select randomly laptops until finding 4 laptops having full charge time less than 3 hours. What is the probability that we must select 20 laptops?

3. The Toeic test scores of students at HCM University of Technology and Education is normally distributed with $\mu = 570$ and $\sigma = 80$.
a/ Calculate the probability that there are at least three test scores above 650 in 50 Toeic tests selected.
b/ What value c is such that the interval $(570 - c; 570 + c)$ includes 98% of all Toeic test scores?

Question II (5.5 points)

1. A store conducted a survey of the lifespan of laptops priced from 700-1000 USD and got the following data:

Lifespan (year)	2.5-3	3-3.5	3.5-4	4-4.5	4.5-5
Laptops	20	15	28	30	10

Suppose that the distribution of lifespan is normal.
a/ Calculate a 95% upper confidence bound for the true average lifespan of this laptop.
b/ Is there compelling evidence for concluding that true average lifespan is 3.5 years? Carry out a test of hypotheses using a significance level of 0.02.
c/ Calculate a 97% confidence interval for the true proportion of laptops having lifespan greater than 4 years.

2. Shopee, Lazada are the leading e-commerce platforms using online payment and cash payment. This year, Lazada offers more discount codes for online payment than Shopee. In a sample of 1200 randomly selected consumers shopping at Lazada, there are 950 of these people choosing online payment. Observe a sample of 1000 randomly selected consumers shopping at Shopee, there are 750 of these people choosing online payment. Does this data strongly suggest that the true proportion of such consumers using online payment at Lazada is greater than at Shopee? Test the hypotheses at significance level 0.05.

3. The following data decribes the expenditure X (million VND/month) on food per month by employees at a certain company, and their corresponding monthly incomes Y(million VND/month).

X	6	8	7	8	8	9	11	10
Y	12	13	14	15	16	17	18	19

Do two variables X and Y have a linear regression relationship? Using the equation for the linear regression, estimate the monthly income of an employee at this company who spends 7 million VND/month on food.

Notice: Invigilators should not explain the questions on the exam papers.

Expected Learning Outcomes	Questions
[ELO 2.1.1]: Compute mean, median, mode, standard deviation, variance, and know their function.	**Question I**
[ELO 2.4.3; 2.4.4]: Become familiar with various graphical representations of data and learn to recognize misleading graphs.	
[ELO 2.4.3; 2.4.4]: Use binomial, normal, Poisson distributions, Hyper geometric distribution and their relationships.	
[ELO 2.1.1, 2.1.2]: Draw probability distribution table for discrete random variables.	
[ELO 2.1.1, 2.1.2]: Calculate the confidence intervals for proportion, mean, variance based on a sample collected.	**Question II**
[ELO 2.1.3, 2.1.4]: Use test procedures to solve and develop proficiency in its applications	
[ELO 2.4.4]: Use linear regression model.	

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Approved by program chair

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