



COMSATS - Lancaster Dual Degree Programme
COMSATS Institute of Information Technology

Lancaster University

Final Examination - Semester Spring-2018

Course Title	Statistics and Probability Theory	Course	MTH-262	Credit	3
Course Instructors:	Dr. Aamir Samadullah, Dr. Muhammad Faruqi, Dr. Tajammal Hussain & Mr. Syed Al Taz	Programme Name:	BSEE/INCS		
Semester:	4 th & 5 th	Batch:	F-A16-SP16	Section:	A, B, C & D
Time Allowed:	180 Minutes	Maximum Marks:			
Student's Name:		Reg. No.:	KIT		

Important Instructions / Guidelines:

- Attempt all questions.
- Use of calculator and area table is allowed.

Question 1:

(8)

The weights of a large number of miniature poodles are approximately normally distributed with a mean of 8 kilograms and a standard deviation of 0.9 kilogram. Find the probability of these poodles having weights

- Over 9.55 kilograms.
- Between 7.25 and 9.15 kilograms inclusive.
- What is the minimum weight of 5% heaviest poodles?

Question 2:

(7)

A random sample of 100 recorded deaths in the United States during the past year showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is *greater* than 70 years? For testing the statement, use a 0.05 level of significance.

Question 3:

(7)

A candy company distributes boxes of chocolates with a mixture of creams, toffees, and nuts coated in both light and dark chocolate. For a randomly selected box, let X and Y , respectively, be the proportion of the light and dark chocolates that are creams and suppose that the joint distribution function is



P.T.O

$$f(x, y) = \begin{cases} \frac{(2(2x + 3y))}{5} & \text{if } 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{elsewhere} \end{cases}$$

(i) Prove that $f(x, y)$ is a joint probability density function.

(ii) Find the marginal probability distribution functions for X and Y, and test the independence.

Question 4:

(7)

To avoid detection at customs, a traveler has placed 12 tablets in a bottle, containing 6 vitamin pills and 6 narcotic tablets that are similar in appearance. If the customs official selected 4 of the tablets at random for analysis, what is the probability that the traveler will be arrested for illegal possession of narcotics?

Question 5:

(7)

It is suspected that an impurity exists in 30% of all drinking wells in a certain rural community. In order to gain some insight into the true extent of the problem, it is determined that some testing is necessary. It is too expensive to test all of the wells in the area, so 10 are randomly selected for testing. Using the binomial distribution find the probability that exactly 3 wells have the impurity.

Question 6:

(7)

On average, 3 traffic accidents per month occur at a certain intersection. Assuming that number of accidents follows a Poisson distribution, find the probability that in any given month at this intersection not less than 5 accidents will occur?

Question 7:

(7)

The following data were collected on the height (inches) and weight (pounds) of women physicians.

Height	68	64	62	65	66
Weight	132	108	102	115	128

- Develop an estimated regression equation for weight by computing the values of intercept and slope.
- Find the estimated weight of a woman having a height of 63 inches.

