



Course Code: MT-206	Course Name: Probability & Statistics
Instructor Names :	M Jamil, M Ashhad, Abdul Basit, Imran Shah
Student Roll No:	Section No:

Instruction:

1. Answer all questions on answer script .
2. All the answers must be solved according to the sequence given in the question paper.
3. Read each question completely before answering it. There are 6 questions and 2 pages

Time: 60 minutes.

Max Points : 65

Question 1: 5 points

In the senior year of a high school graduating class of 100 students, 42 studied mathematics, 68 studied psychology, 54 studied history, 22 studied both mathematics and history, 25 studied both mathematics and psychology, 7 studied history but neither mathematics nor psychology, 10 studied all three subjects, and 8 did not take any of the three. Randomly select a student from the class and find the probabilities of a person is taking both history and mathematics given that person is not taking psychology .

Question 2: 15 points

A shipment of 7 television sets contains 2 defective sets. A hotel makes a random purchase of 3 of the sets. If x is the number of defective sets purchased by the hotel, find

- (i) Probability distribution of X
- (ii) Cumulative distribution function of X
- (iii) Variance of X

Question 3: 15 points

A continuous random variable X that can assume values between $x = 2$ and $x = 5$ has a density function given by $f(x) = \frac{2}{27}(1+x)$. Find

- (i) Cumulative distribution function of X
- (ii) Using $F(x)$ compute $P(3 \leq X < 4)$
- (iii) Find expected value of X

Question 4:10 points

The grades of a class of 6 students on a midterm report (x) and on the final examination (y) are as follows:

x	77	50	71	72	81	94
y	82	66	78	34	47	85

- Estimate the linear regression line.
- Compute correlation coefficient r and comments about value of r

$$\text{where } r = \frac{n \sum xy - \sum x \sum y}{\sqrt{\{n \sum x^2 - (\sum x)^2\} \{n \sum y^2 - (\sum y)^2\}}}$$

Question 5:10 points

It is known that 60% of mice inoculated with a serum are protected from a certain disease. If 5 mice are inoculated, find the mean, variance and probability that

- none contracts the disease;
- fewer than 2 contract the disease;

Question 6:10 points

On average, a textbook author makes two wordprocessing errors per page on the first draft of her textbook. What is the probability that on the next page she will make

- 4 or more errors?
- no errors?

Table A.1 Binomial Probability Sum $\sum_{x=0}^r b(x; n, p)$

n	r	p									
		0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.70	0.80	0.90
5	0	0.5905	0.3277	0.2373	0.1681	0.0778	0.0313	0.0102	0.0024	0.0003	0.0000
	1	0.9185	0.7373	0.6328	0.5282	0.3370	0.1875	0.0870	0.0308	0.0067	0.0005
	2	0.9914	0.9421	0.8965	0.8369	0.6826	0.5000	0.3174	0.1631	0.0579	0.0086
	3	0.9995	0.9933	0.9844	0.9692	0.9130	0.8125	0.6630	0.4718	0.2627	0.0815
	4	1.0000	0.9997	0.9990	0.9976	0.9893	0.9688	0.9222	0.8319	0.6723	0.4095
	5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Table A.2 Poisson Probability Sum $\sum_{x=0}^r p(x; \mu)$

r	μ									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	
0	0.3679	0.2231	0.1353	0.0821	0.0498	0.0302	0.0183	0.0111	0.0067	
1	0.7358	0.5578	0.4060	0.2873	0.1991	0.1359	0.0916	0.0611	0.0404	
2	0.9197	0.8088	0.6767	0.5438	0.4232	0.3208	0.2381	0.1736	0.1247	
3	0.9810	0.9344	0.8571	0.7576	0.6472	0.5366	0.4335	0.3423	0.2650	
4	0.9963	0.9814	0.9473	0.8912	0.8153	0.7254	0.6288	0.5321	0.4405	
5	0.9994	0.9955	0.9834	0.9580	0.9161	0.8576	0.7851	0.7029	0.6160	
6	0.9999	0.9991	0.9955	0.9858	0.9665	0.9347	0.8893	0.8311	0.7622	
7	1.0000	0.9998	0.9989	0.9958	0.9881	0.9733	0.9489	0.9134	0.8666	
8		1.0000	0.9998	0.9989	0.9962	0.9901	0.9786	0.9597	0.9319	
9			1.0000	0.9997	0.9989	0.9967	0.9919	0.9829	0.9682	