COMSATS University Islamabad Abbottabad Campus Department of Mathematics

Terminal Exam Fall 2024

Class: BSE 5C/BCS 4C
Subject: Statistics & Probability Theory
Name:

Date: 17/01/2025
Instructor: Asif Rafique
Registration #

Section A (Marks: 60)

Problem 1

(a). In a poker hand consisting of 5 cards, find the probability of holding 3 jack and 2 heart.

(b) Suppose that in a senior college class of 500 students it is found that 210 smoke, 258 drink alcoholic beverages, 216 eat between meals, 122 smoke and drink alcoholic beverages, 83 eat between meals and drink alcoholic beverages, 97 smoke and eat between meals, and 52 engage in all three of these bad health practices. Make Venn diagram for given data.

Problem 2.

(a) The probability that an automobile being filled with gasoline will also need a change is 0.25; the probability that it needs a new oil filter is 0.40; and the probability that both the oil and filter need changing is 0.14. If a new oil filter is needed, what is the probability that the oil has to be changed?

(b) Suppose the probability that any given person will believe a tale about the transgressions of a famous actress is 0.8. What is the probability that the sixth person to hear this tale is the fourth one to believe it?

Problem 3.

(a) The probability that a student pilot passes the written test for a private pilot's license is 0.7. Find the probability that a given student will pass the test on the third try.

(b) The probability that a patient recovers from a delicate heart operation is 0.9. Of the next 100 patients having this operation, what is the probability that between 84 and 95 inclusive survive?

Problem 4.

(a) From a box containing 4 black balls and 2 green balls, 3 balls are drawn randomly from this box. Find the probability distribution for the number of green balls.

(b) An inventory study determines that, on average, demands for a particular item at a warehouse are made 5 times per day. What is the probability that on a given day this item is requested more than 3 times?

Problem 5.

Let X be a random variable with the following probability distribution:

X	-3	6	9
f(x)	1/6	1/2	1/3

Find $\mu_{[g(x)]}$, where $g(X) = (2X + 1)^2$, and Var[g(x)].

Section B: (Marks: 40)

Problem (1).

(a) A nationwide survey of seniors by the University reveals that almost 70% approve of daily pot smoking, according to a report in *Parade*. If 12 seniors are selected at random and asked their opinion, find the probability that the **number** who disapprove of smoking pot daily is from 7 to 9, and at least 2.

(b) To avoid detection at customs, a traveler places 6 narcotic tablets in a bottle containing 9 vitamin pills that are similar in appearance. If the customs official selects 3 of the tablets at random for analysis, what is the probability that the traveler will be arrested for illegal possession of narcotics?

Problem (2).

Given the normally distributed variable X with mean 18 and standard deviation 2.5, find

(a) $P(X < 15)$:
(b) The value of k such that $P(X < k) = 0.2236$;
(c) The value of k such that $P(X > k) = 0.1814$.

Problem (3).

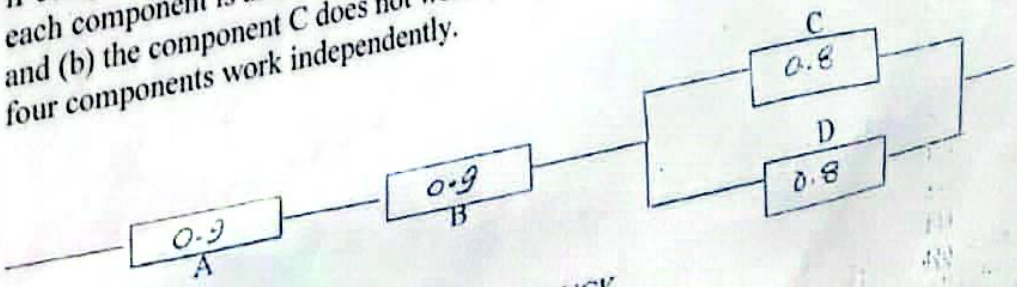
The grades of a class of 9 students on a midterm report and on the final examination are as follows:

x	77	50	71	72	81	94	96	99	67
y	82	66	78	34	47	85	99	99	68

(a) Estimate the linear regression line.
(b) Estimate the final examination grade of a student who received a grade of 85 on the midterm report.

Problem (4).

An electrical system consists of four components as given below. The system works if components A and B work and either of the components C or D works. The reliability of each component is also shown in Figure. Find the probability that (a) the entire system works and (b) the component C does not work, given that the entire system works. Assume that the four components work independently.



GOOD LUCK