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**BAHRIA UNIVERSITY (KARACHI CAMPUS**)

FINAL EXAMINATION –SPRING SEMESTER – 2020

**(Probability & Statistics: GSC-122)**

Class: **BS (CS) – 3A & 3B**  **(Morning)**

Course Instructor: **Ms. Dania Wahab and Engr**. **Ahmed Faraz** Time Allowed: **08 Hours** Date: **7th July 2020; Session: I** Max Marks: **50**

**Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Enrolment #\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Note:** All questions carry equal marks.

In addition to upload the solution on LMS, please also email it to course instructor.

In order to avoid any run time electricity and internet unavailability situation, it is suggested that keep your

laptop charged. Also activate 3G/4G connection as an alternative of Wi-Fi / internet option to upload your

solution.

**Instructions**

* ‘Final Exam Paper’ in Paper section uploads on Monday July 6, 2020 on LMS of CMS (BUKC).
* Student will return their hand written answer sheets as a combine PDF file on the same exam day i.e. Monday July 6, 2020. Early Submission will be highly appreciable.
* Students are required to comment for all necessary steps in solution.
* Students should mention their name, registration number, date of submission, class with section, semester, instructor name etc.
* Every page of PDF file must contain handwritten name, registration number and page number on the top left corner.
* Attempt all question by Blue or Black Pen only.
* Provide a related short summary as a result after every solution based on minimum 3 sentences.

Q1a# Define any two of the following events with example: (2)

1. Equally Likely Events
2. Mutually Exclusive Events
3. Mutually not exclusive Events
4. Exhaustive Events
5. Independent Events
6. Dependent Events

Q1b# If *g* (*x*) = *x*2 and *f* (*x*) = , for *x* = 0, 1, 2, 3, 4, 5 then find the following terms: (4)

1. E[*g* (*x*)]
2. E[ *x*] for *f* (*x*) and E[ *x*] for *g* (*x*)
3. Var [ *x*] for *f* (*x*)
4. Var[ *x*] for *g* (*x*)

Q1c# Prove the following properties by assuming X and Y as a random variable and a as a constant: (4)

1. E [a X] = a E [X]
2. E [X ± Y] = E[X] ± E[Y]

Q2a# Consider a random variable ‘x’ for no of tails occurring in 4 tosses of a fair coin. Provide tabular and equation form of probability mass function of this random variable ‘x’. Also describe this p.m.f. (x) a line graph. (4)

Q2b**#** Consider two normal distributions, one with mean -4 and standard deviation 3, and the other with mean 6 and standard deviation 3. Answer true or false to each statement and explain your answers. (6)

1. The two normal distributions have the same shape.
2. The two normal distributions are centered at the same place.

Q3a# Present the list of Discrete Probability Distribution. (2)

Q3b# Define a binomial random variable, binomial experiment, binomial probability mass function, and binomial distribution. Also define binomial distribution versus poisson distribution. (4)

Q3c# The probabilities that a patient recovers from COVID-19 is 0.42 If there are 18 patients available in quarantine under treatment then what is the probabilities of recovery of 5 patients?

(4)

Q4a# Differentiate the probability mass function and cumulative distribution function for a random variable describing the product of two dices. (4)

Q4b# **Age and Price of Orions:** The age and price data for a sample of 11 Orions are repeated in the following table:(6)

|  |  |
| --- | --- |
| **Age (yr) x** | **Price ($100) y** |
| 5 | 85 |
| 4 | 103 |
| 6 | 70 |
| 5 | 82 |
| 5 | 89 |
| 5 | 98 |
| 6 | 66 |
| 6 | 95 |
| 2 | 169 |
| 7 | 70 |
| 7 | 48 |
| **58** | **975** |

1. Compute the linear correlation coefﬁcient, *r* , of the data.
2. Interpret the value of *r* obtained in part (a) in terms of the linear relationship between the variables age and price of Orions.
3. Discuss the graphical implications of the value of *r*.

Q5a# Provide the sample space for two dice role experiment by considering a random variable for product of two dices. (2)

Q5b# If on the average 7 customers arrives at a Dunkin Donuts in a minute then finds the following probabilities: (4)

1. At most 5 will arrive in a minutes
2. At least6 will arrive during an interval of 3 minutes

Q5c# Describe Normal Distribution and standard normal distribution and find the following probabilities by considering *x* as a random variable of standard normal distribution: (4)

(Table of standard normal distributed z-value is available below)



