Advanced Statistical Methods

BCA2221

Assingment 2

Date: 21.04.2022 **Due on: 28.04.2022**

Solve the following problems. Show your work.

1. Define a random sample. (1)

2. Let $x_1, x_2, \dots, x_n$ be any numbers, and $\bar{x} = (x_1 + x_2 + \cdots + x_n)/n$. Then, prove that

$$(n-1)s^2 = \sum_{i=1}^{n}(x_i - x)^2 = \sum_{i=1}^{n} x_i^2 - n\bar{x}^2$$

(1)

3. Let $X_1, X_2, \dots X_n$ be a random sample from a $N(\mu, \sigma^2)$ populations. Find the mgf of the sample mean. (1)

4. Suppose $X_1, X_2, \dots$ are jointly continous and independent, each distributed with marginal pdf $f(x)$. If the X_is represent annual rainfalls at a given locations, find the distribution of the number of years until the first year's rainfall, X_1, is exceeded for the first time. (1)