Habib University

Introduction to Probability and Statistics – EE 354/CE 361/MATH 310 (L1) – Fall 2023

Instructor – Dr. Aamir Hasan - Section L1

Time = 20 Minutes **Quiz No 3 – September 27, 2023** *(Please show detailed working)* **[20 points]**

Problem 1 [12 points] - [Random Variables]

A Random Variable Z_n is defined as $Z_n = \max(X_1; X_2; \ldots; X_n)$, where X_i are outcomes of identical and independently distributed of a 5-sided die. As an example $Z_2 = \max(X_1;X_2)$ - meaning Z_2 is the maximum of the outcome of two independent throws of the 5-sided die X_1 and X_2.

Part a [4 points] - Calculate $\mathbf{P}(Z_{10} = 1)$?

Part b [2 points] - Calculate $\mathbf{P}(Z_{10} > 1)$?

Part c [4 points] - Calculate $\mathbf{P}(Z_{10} = 2)$?

Part d [2 points] - Calculate $\mathbf{P}(Z_{10} > 2)$?

Note - present your final answers and reasoning clearly. Most of the total score for this question will be awarded on your reasoning. Random or incoherent scribbles will not be graded.

Problem 2 [8 points] - [Probability Mass Function]

You throw a tetrahedral dice 3 times. R.V X is the number of times you get 1 in the 3 throws & $P_X(x)$ is the Probability of getting No 1, x-times in 3 throws, where x can be 0, 1, 2 or 3. Calculate & plot the probability mass function of $P_X(x)$.