Math 5710 Tuesday, 7/21/20 Quiz 21

1. What is your name?

2. For each of the following propositions, determine whether it is true or not; indicate your determination in the usual way and then write a paragraph justifying your choice:

A. $X \in \{\text{ Bernoulli random variables }\} \Rightarrow X \in \{\text{ binomial random variables }\}$

T F

Sample justification:

Compare the two definitions:

$X \in \{\text{ Bernoulli random variables of } \Omega \} \Leftrightarrow$
$X \in \{\text{ discrete random variables of } \Omega \} \wedge X : \Omega \rightarrow \{ 0, 1 \}$

Given $n \in \mathbb{N} \wedge \Omega = \{ 1, 2, 3, ..., n \} \wedge X \in \{\text{ Bernoulli random variables of } \{ 0, 1\}\} \wedge$ (A string of n experiments are conducted with $X \ni (X(i) = 0 \veebar (X(i) = 1$ depending on the results of the i^{th} experiment $\wedge \lvert \{ (i, X(i)) : X(i) = 1 \} \rvert = k$),
($Y \in \{\text{ binomial random variables of } \Omega \} \Leftrightarrow$

$$Y : \Omega \rightarrow \omega \ni Y(i) = \sum_{i}^{n} X(i) = k$$

Any Bernoulli random variable is a binomial random variable in which n from the definition of binomial random variable is 1.

B. $X \in \{\text{ binomial random variables }\} \Rightarrow X \in \{\text{ Bernoulli random variables }\}$

T F

Sample justification:

Look at the following statement from the definition of Bernoulli random variable: $X : \Omega \rightarrow \{ 0, 1 \}$. This assures us that the n in the definition of binomial random variable cannot be greater than 1 for any Bernoulli random variable. So any binomial random variable that requires more than 1 trial is not Bernoullian.

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3. Smile.