6/03/20

Agenda for Math 5710 ♬ Meeting #7 ☻☺ 6/30/20 (8:00 a.m. – 9:10 a.m.)

1. Hello:

Brigham City:	Adam Blakeslee	Ryan Johnson	Tyson Mortensen	
Logan:	David Allen	Natalie Anderson	Kameron Baird	Stephen Brezinski
	Zachary Ellis	Adam Flanders	Brock Francom	Xiang Gao
	Ryan Goodman	Janette Goodridge	Hadley Hamar	Phillip Leifer
	Brittney Miller	Jonathan Mousley	Erika Mueller	Shelby Simpson
	Steven Summers	Matthew White	Zhang Xiaomeng	

2. Note the syllabus' activity list for today:

07: T/6/30	1. Construct the following concepts and comprehend associated communication structures: complement of events and probability functions. 2. Formulate conjectures w/r probability functions and possibly elevate them to the rank of theorems. 3. Take advantage of Quiz 07.

3. Briefly, raise and address issues and questions stimulated by the following homework assignment:

   Complete the following assignment prior to Meeting #7:

   A. Study our notes from Meeting #6 ; comprehend Jim's sample responses to the Quiz #6 prompts that are posted on *Canvas*. L

   B. Comprehend the entries from Lines #029A–F from our *Glossary* document.

   C. From the Video Page of *Canvas*, view with comprehension the video "khan intro to probability - basic. "

4. Take a slow trip inside the following definition from Line 030 of our Glossary:

   030. Probability Measures (i.e., probability distributions or probability functions)

   Given Ω is a sample space $\wedge\, E = \{$ events of $\Omega\,\}$,
   $(\, p \in \{$ probability measures on $\Omega\,\} \Leftrightarrow$
   $p : E \rightarrow [\,0, 1\,] \ni (\, p(\,\Omega\,) = 1 \wedge (\, A_1 \subseteq E \wedge A_2 \subseteq E \;\wedge$
   $A_1 \cap A_2 = \varnothing\,) \Rightarrow p(\,A_1 \cup A_2\,)) = p(A_1) + p(A_2\,))$

5. Identify the probability distribution (i.e, measure or function) from our Sybil's experiment discussed during Meeting #6:

For the purpose of formulating the rules of a game of chance in which a pair of fair dice (a red die and a yellow die) are rolled one time, Sybil wants to determine the likelihood of each of the possible *events* determined by the sum of the number of dots that appear on the top face of the yellow die and on the top face of the red die.

Sybil thinks, "Each die has six faces – a face with one dot, a face with two dots, a face with three dots, a face with four dots, a face with five dots, and a face with six dots. So there are 36 possible *outcomes* since 36 is the cardinality of the following set:

$\{ (r, y) : r =$ the number of dots on the red die's top face $\wedge$
$y =$ the number of dots on the red die's top face $\} =$
$\{ (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6),$
$(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6),$
$(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6) \}$

And since I'm interested in the *random probability* of each of the possible *events*, the *events* of interest are the sum of numbers associated with the two top faces. So each event is associated with one element in the following set: $\{ 2, 3, 4, 5, ..., 12 \}$. I'll count the number outcomes are associated with each of the 12 events:

Let X_i = the event that the sum is i. Thus,
$|X_2| = |\{ (1, 1) \}| = 1$
$|X_3| = |\{ (1, 2), (2, 1) \}| = 2$
$|X_4| = |\{ (1, 3), (2, 2), (3, 1) \}| = 3$
$|X_5| = |\{ (1, 4), (2, 3), (3, 2), (4, 1) \}| = 4$
$|X_6| = |\{ (1, 5), (2, 4), (3, 3), (4, 2), (5, 1) \}| = 5$
$|X_7| = |\{ (1, 6), (2, 5), (3, 4), (4, 3), (5, 2), (6, 1) \}| = 6$
$|X_8| = |\{ (2, 6), (3, 5), (4, 4), (5, 3), (6, 2) \}| = 5$
$|X_9| = |\{ (3, 6), (4, 5), (5, 4), (6, 3) \}| = 4$
$|X_{10}| = |\{ (4, 6), (5, 5), (6, 4) \}| = 3$
$|X_{11}| = |\{ (5, 6), (6, 5) \}| = 2$
$|X_{12}| = |\{ (6, 6) \}| = 1$

So the most likely event is X_7 and the two events that are less likely than any of the others are X_2 and X_{11}. And my chart above shows the scale for each events. Then I'll use the chart to compute the exact theoretical probabilities by reporting the probabilities as the ratio of each of those events and 36 (i.e., $p(X_i) = X_i \div 36$."

Sybil smiles.

Sidebar peek into the future: In a couple of weeks, we will focus on the concept of *discrete random variable*. Peek at Line 038 from our Glossary and then identify then identify the random variables that were the foci of Sybil's experiment.

6. Given that $p \ni (p \in \{$ probability measures on Ω $\}$, comprehend the following propositions:

   A. $p(A^c) = 1 - p(A)$

   B. $p(\varnothing) = 0$

   C. $A \subseteq B \Rightarrow p(A) \leq p(B)$

   D. $p(A \cup B) = p(A) + p(B) - p(A \cap B)$

7. Take advantage of Quiz 07.

8. Complete the following assignment prior to Meeting #8:

   A. Study our notes from Meeting #7 ; comprehend Jim's sample responses to the Quiz #7 prompts that are posted on *Canvas*.
   L

   B. Comprehend the entry from Line #030 from our *Glossary* document.

   C*. Examine each of the following propositions to determine whether or not it is true; indicate your determination in the usual way and then prove that the determination is correct (Please post the resulting PDF using the appropriate Canvas Assignment link):

   i. $p(A^c) = 1 - p(A)$

   T F

ii. $p(\varnothing) = 0$

T F

iii. $A \subseteq B \Rightarrow p(A) \leq p(B)$

T F

iv. $p(A \cup B) = p(A) + p(B) - p(A \cap B)$

T F

D. Comprehend Jim's sample responses to Prompt 8-C's that are posted on *Canvas*.

9. Please consider the following advice:

Seek peace through truth; seek trough mathematics.