6/30/20

Agenda for Math 5710 ♬ Meeting #19 ☻☺ 7/17/20 (8:00 a.m. – 9:10 a.m.)

1. Hello:

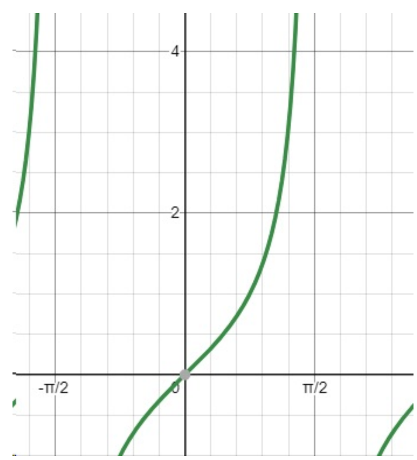
Brigham City:	Adam Blakeslee	Ryan Johnson	Tyson Mortensen	
Logan:	David Allen	Natalie Anderson	Kameron Baird	Stephen Brezinski
	Zachary Ellis	Adam Flanders	Brock Francom	Xiang Gao
	Ryan Goodman	Janette Goodridge	Hadley Hamar	Phillip Leifer
	Brittney Miller	Jonathan Mousley	Erika Mueller	Shelby Simpson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

2. Note the syllabus' activity list for today:

19: F/7/17	1. Construct the following concepts, comprehend associated communication structures, and employ associated algorithms: random variables and discrete distribution functions, 2. Take advantage of Quiz 19.

3. Address the following problem with an experiment and relate it to a *continuous random variable*:

A number is randomly selected from (0, $\pi/2$). What is the probability that the sine of the selected number is greater than the cosine of that number?



4. And once again (and again and again), remind ourselves of Sybil's problem and experiment and relate it to a *discrete random variable*:

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 that 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.

5. Carefully and deeply comprehend the following definitions:

   038. Definition for *discrete random variable* : $X \in \{$ discrete random variables of $\Omega \}$
   $\Leftrightarrow$
   $(|\Omega|, |X| \in \{\aleph_o, 0, 1, 2, 3, ...\} \wedge E = \{$ events of $\Omega\} \wedge X : E \rightarrow \mathbb{R})$

   39A. Definition for *discrete probability distribution* :

   Given $X \in \{$ discrete random variables of $\Omega \}$,
   ($m \in \{$ discrete probability distribution for $X\} \Leftrightarrow m : X \rightarrow [0, 1] \wedge \sum_{x \in E} m(x) = 1$)

   39B. Definition for discrete *uniform probability distributions* :

   Given $m \in \{$ discrete distribution functions for X on $\Omega\} \wedge |\Omega| = n \ni n \in \mathbb{N}$,
   ($m \in \{$ discrete uniform probability distribution functions for X on $\Omega\} \Leftrightarrow$
   $m(x) = \frac{1}{n} \; \forall x \in X$

6. Take advantage of Quiz 19.

7. Complete the following assignment prior to Meeting #20:

   A. Study our notes from Meeting #19.

   B. Comprehend Jim's sample response to Quiz 19.

   C. Comprehend Entry #038 & #39A–B of our *Glossary*.

   D*. Please solve the following problems; display the computations, and upload the resulting pdf document on the appropriate Canvas assignment link:

   The diameter of flat metal disk manufactured by a factory is a random number between 4 and 4.5. What is the probability that the area of such a flat disk chosen at random is at least 4.41π ?

   E. From the Video Page of *Canvas*, view with comprehension the video names "intro to discrete random variables and discrete probability distributions."

   F. Comprehend Jim's sample responses to the homework prompts that are posted on *Canvas*.

8. Ask yourself the following question: Do some adults use the *Rudolf the Red-Nosed Reindeer*
story to teach children that love is conditional?

$p($ people love us $) < p($ people will love us $|$ our deeds are celebrated $) \}$

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