6/08/20

Agenda for Math 5710 ♬ Meeting #23 ☻☺ 7/23/20 (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:

23: H/7/23	1. Deepen our conception of continuous random variables. 2. Construct the following concept, comprehend associated communication structures, and employ associated algorithms: continuous probability density functions, sample space coordinates, cumulative density functions of continuous random variables, and assignment of probabilities 3. Take advantage of Quiz 23.

3. Briefly raise issues and questions prompted by the following homework assignment:

A. Study our notes from Meeting #22.

B. Comprehend Jim's sample response to Quiz 22.

C. Comprehend Entry #044A–E of our *Glossary*.

D. From the Video Page of *Canvas*, view with comprehension the videos named "geometric random variables," "negative binomial distribution," "hypergeometric distributions," and "Poisson process 1 probability and statistics Kahn Academy."

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

i. A person is randomly selected from a population and tested for COVID-19 infection. A positive test result is labeled a "success" and coded as 1; a negative test result is labeled a "failure" and coded as 0. If the first person selected is infected, then the experiment is completed. If the first person is not infected than the experiment continues with the same population. This process is repeated until an infected person is selected. As of May 26, 2020, one seemingly credible estimate is 30% of the people worldwide are infected; use that figure for this problem.

Compute the probability that exactly 4 trials are executed before an infected person is identified.

ii. Five cards are randomly selected from a standard 52-card poker deck and this is done *without replacement*. Determine the probability that exactly two of the selected cards are red.

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

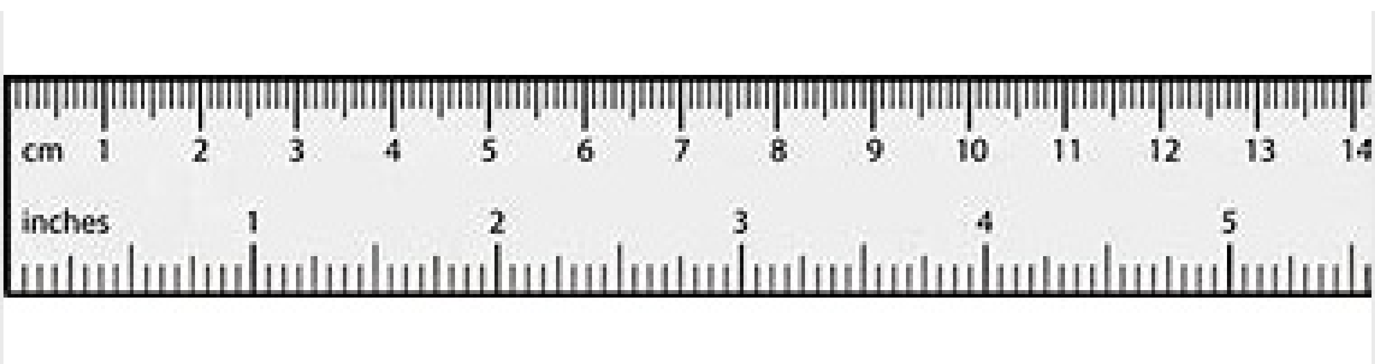
4. As we embark on our transition from discrete random variables to continuous random variables, let's reflect a bit on four examples of related transitions:

i. A transition from discrete data based on tests of cognitive or affective traits to continuous data based on consideration of the *SEM* of those test results:

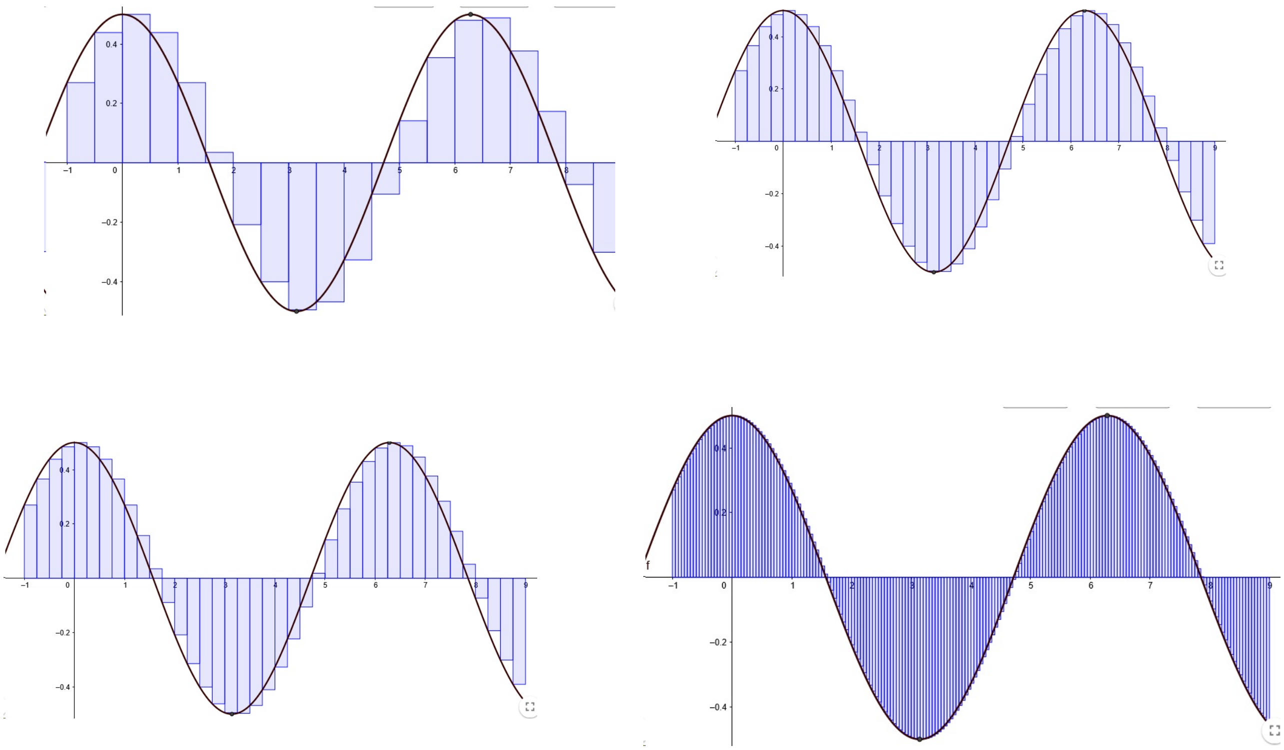
D_0 is interpreted in light of $D_0 \pm SEM$. So instead of thinking of a specific test score as a unique number, the score is thought of as a number that exists within a real-numbered interval.

ii. A transition from sample statistics to population parameters (e.g., $\overline{X}$ to μ_x

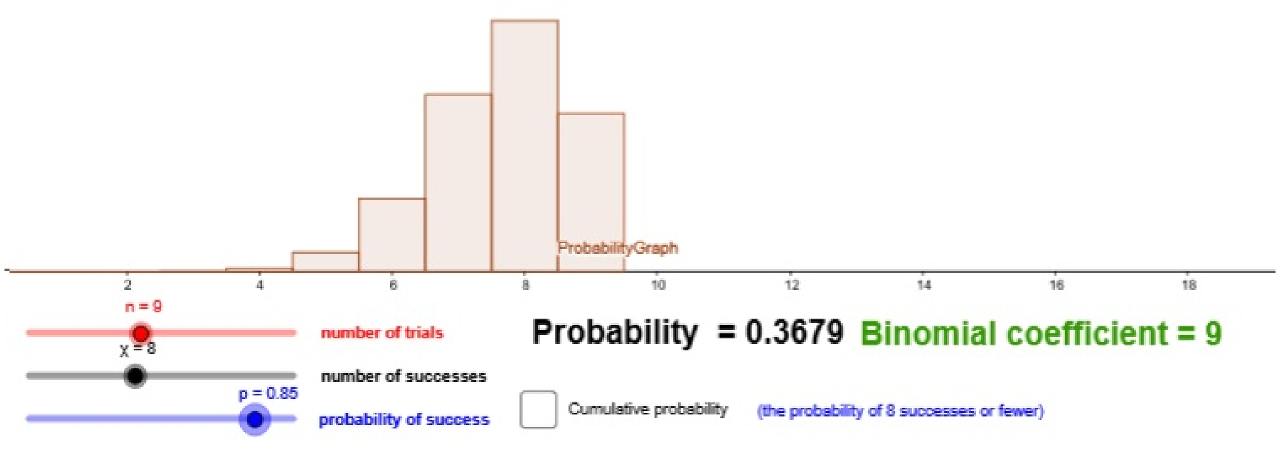
iii. Measurements of length

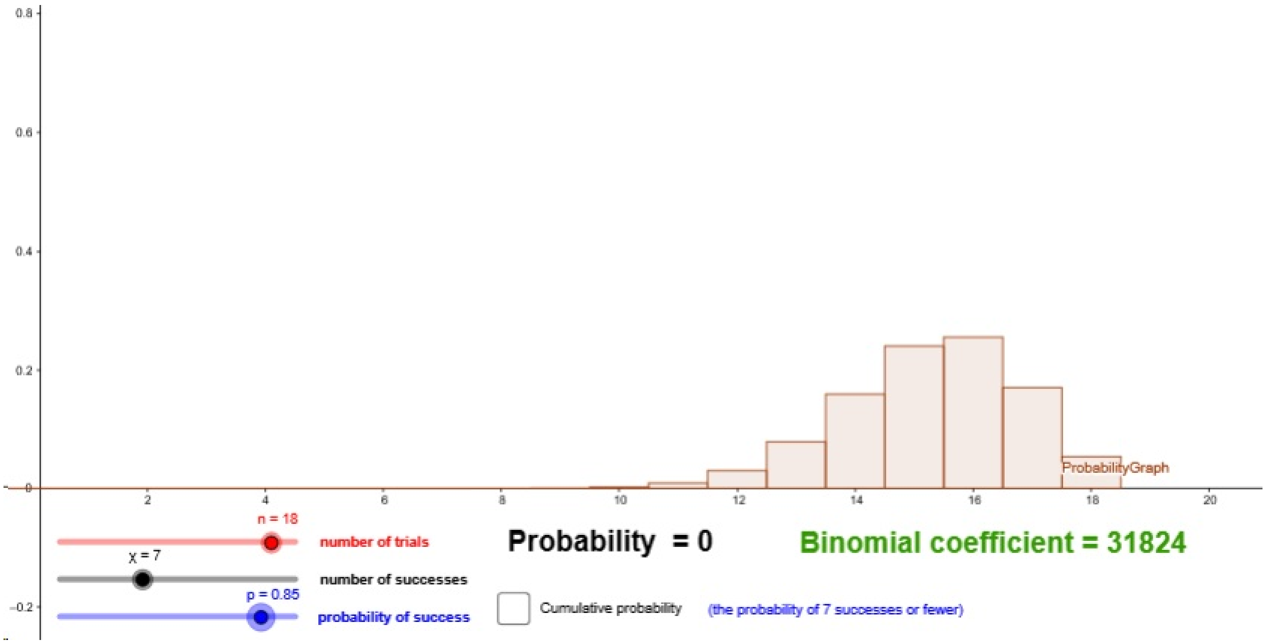


iv. A transition from Riemann sums to definite integrals



5. Consider binomial probability distributions with 9 trials to a similar one with 20 trials:





6. Comprehend the following Entries 045 & 046A-C from our glossary:

045. Definition for *continuous random variable* :

Definition for *continuous random variable* : $X \in \{$ continuous random variables of $\Omega\ \} \Leftrightarrow$
$(|\ \Omega\ |, |\ X\ | \in \{\ \mathcal{C}^n : n \in \mathbb{N}\ \} \wedge\ E = \{$ events of $\Omega\ \} \wedge\ X : E \to \mathbb{R}\ )$

046. Definitions for *density function of continuos random variables* and *cumulative density function of continuos random variables* and a theorem:

A. Given $X \in \{$ continuous random variable $\}$, ($f \in \{$ density functions of $X\ \} \Leftrightarrow$
$f : \mathbb{R} \to \mathbb{R} \ni p(\ a \le X\ \le b\ ) = \int_a^b f(x)dx\ \forall\ a, b \in \mathbb{R}\ )$

B. Definition for cumulative distribution function of continuous random variables:
Given $X \in \{$ continuous random variable $\}$,
($F_X \in \{$ cumulative distribution function of $X\ \} \Leftrightarrow F_X : \mathbb{R} \to \mathbb{R} \ni p(\ X \le x\ ))$

C. Theorem 12:

($X \in \{$ continuous random variable $\}$ with density function f) $\Rightarrow$

(The cumulative distribution function of $X = F \ni (F(x) = \int_{-\infty}^x f(t)dt$)

$\wedge\ \frac{d}{dx} F(x) = f(x)$)

5. Take advantage of Quiz 23.

6. Complete the following assignment prior to Meeting #24:

   B. Comprehend Jim's sample response to Quiz 23.

   C. Comprehend the following Entries 045 & 046A-C from our glossary

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

   For an experiment x is randomly drawn from $\mathbb{R}$. Given A is the event that $x = 0$ $\wedge$ B is the event that $x \in (\,^{-}0.0001, 0.0001\,)$, compute $p(\,A \mid B\,)$.

   E. From the Video Page of *Canvas*, view with comprehension the videos named "intro continuous prob distributions" and "mmContinuous Random Variables Probability Density Functions. "

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

7. And from *XKCD*: