

Class 21: The Central Limit Theorem!

Calculus II

College of the Atlantic. Feb 23, 2023

In this activity you will convert playing cards into numbers as follows. Number cards have a value equal to their number. Aces count as one. And face cards (king, queen, jack), all count as ten.

1. Give your deck of cards a quick shuffle and pull a card from the deck. Write that number down. Put that card back in the deck.
2. Repeat the above process four more times, so that you have a list of five numbers.
3. Add the numbers together and write the number on a post-it.
4. Repeat the above three steps a few more times so that you have around ten post-its with numbers on them.
5. Then take your post-its and stick them on the histogram on the board.

It is well known that the average mass of wild unicorns is 100 kg with a standard deviation of 12. In your cosmic ray unicorn-creation experiments you have created 55 unicorns. You measure the masses of these 55 unicorns and determine that their average mass is 96. Hmm... Is the mass of this group of unicorns unusually low compared to wild unicorns?

1. If you sampled 55 wild unicorns, how would that mean be distributed?
2. How likely is it that sampling common unicorns would lead to a mean as or more extreme than the mean you found?



Figure 1: An illustration from the book *The history of four-footed beasts and serpents* by Edward Topsell. Special Collections, University of Houston Libraries. Creative Commons CC0 1.0 Universal Public Domain Dedication. <https://commons.wikimedia.org/wiki/File:Oftheunicorn.jpg>.