

Topic 00: Introduction to the Course

Ethan P. Marzban University of California, Santa Barbara PSTAT 120B



Outline

1. Why Statistics?

2. Alright, enough waffling - Let's Get Started!



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- **OH:** Wednesdays 3 - 4:30pm in GIRV 2123
TBD via Zoom



It Takes a Village...

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 - Due to capacity constraints on the rooms, we cannot allow overenrollment of sections. To unofficially switch Sections, please see the instructions on the Course Website.



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 - If you need to miss an exam for a university-sanctioned sporting event or a sickness, please reach out to Ethan ASAP to discuss.



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- Please see the syllabus for more information about general course policies, as well as information on how your final grades for this course will be calculated.



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 - Thank you so much for your understanding!

Why Statistics?



Rent Burden

More Renters Than Ever Before Are Burdened by the Rent They Pay

A new Harvard report says 22.4 million households in the United States now spend more than 30 percent of their income in rent, with 12.1 million spending more than 50 percent.

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- Where did this 22.4 million come from?
- Do we trust this statistic? Would small changes to the overall experiment result in drastically different results?
- If we collected data, how likely would it be for our own findings to match the New York Times's?



World Record: Holding Breath

56-year-old freediver holds breath for almost 25 minutes breaking record

By Connie Suggitt

Published 12 May 2021

<https://www.guinnessworldrecords.com/news/2021/5/freediver-holds-breath-for-almost-25-minutes-breaking-record-660285>



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- What is the true longest time a person can hold their breath?
- If we collected data on the times various people held their breaths, how could we construct a “good” estimate of the true longest time a person can hold their breath?



Data Science

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- Indeed, Data Science has emerged as a field to help process, analyze, and understand data.
- But, Data Science didn't come out of nothing - it is predicated on a strong, formal way of handling uncertainty.



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 - We'll be doing a fair amount of math, and we'll be developing some pretty formal and careful mathematically-styled arguments.
 - But, I hope you don't lose sight of the bigger picture!



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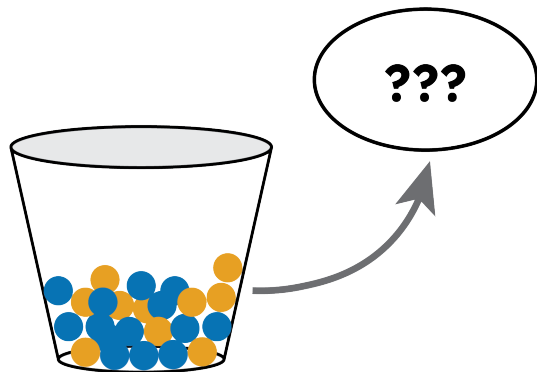


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- But, probability and statistics exist as two separate (but overlapping) fields.
- To highlight the distinction between probability and statistics, allow me to use a metaphor that my own statistics professor used when I was taking my first mathematical statistics course.

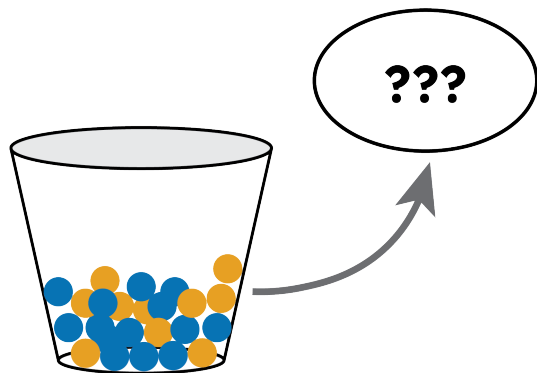


Scenario 1





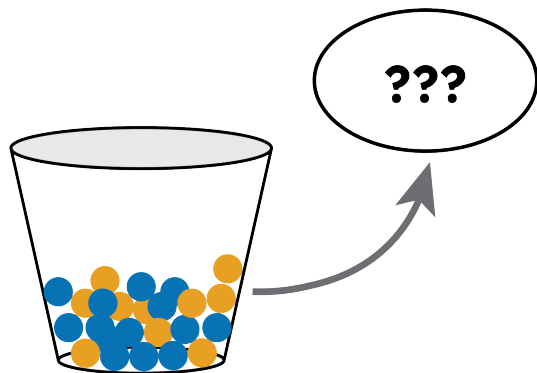
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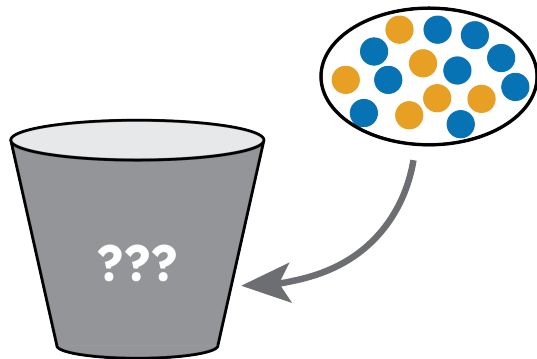
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- Given our knowledge of what's in the bucket, we want to inform what's in our hand (e.g. number of gold marbles, probability of having more than 3 blue marbles, etc.)

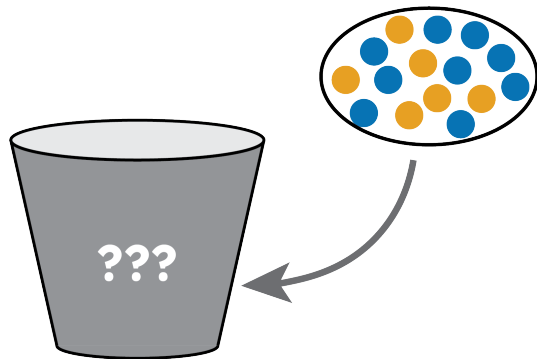


Scenario 2





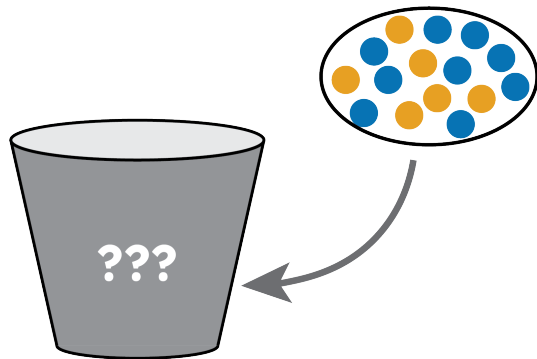
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- Scenario 2 is statistics (specifically, inferential statistics).
 - Typically, the goal of inferential statistics is to use a sample to make *inferences* (we'll talk more about these later in the course) about a larger population.



PSTAT 120B

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- Then, we'll move into the realm of inferential statistics (specifically, estimation, confidence intervals, and hypothesis testing).
- Finally, we'll finish off by comparing across samples and seeing what that tells us about potential differences across populations.

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