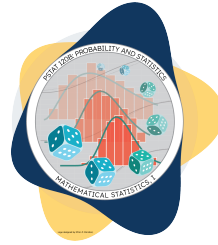

Topic 7: Conclusion

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

Recap

- We've covered a lot of ground this quarter!

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- We've worked through conditional distributions/expectations, transformations, estimation, and hypothesis testing.
- But what was it all for?

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Learning Outcomes

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  - Think critically about the assumptions needed to implement various statistical procedures (and to question results when such assumptions are violated)
  - Accurately express your beliefs and conclusions about problems and concepts in a mathematically and statistically rigorous manner

Learning Outcomes

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- For example, why is consistency a desirable property?
- Well, like I said many times before, a consistent estimator is one that we become more and more certain attains the true value of the parameter it is seeking to estimate.
- Similarly, the central limit theorem allows us to start with very little information about our population, yet still perform inference on population means and/or standard deviations.

Learning Outcomes

- In service of the second goal, I encourage you to think about the various word problems we encountered in our section on estimation.

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- We know that the *sample maximum* of a collection of breath-holding-times will be a "good" (i.e. consistent) estimator for the true longest time someone can hold their breath underwater

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Learning Outcomes

- In service of the third goal, I encourage you to think critically about statistics and results that are quoted to you.
- In fact, let's quickly skim through a particular case study: https://www.nutrisystem.com/pdf/13lb7in-study.pdf

Learning Outcomes

- I also caution you to look out for ***p*−hacking**, whereby an experimenter will repeat an experiment until they obtain a significant $p-$value and report *only* that $p-$value.

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Learning Outcomes

- I also caution you to look out for ***p*−hacking**, whereby an experimenter will repeat an experiment until they obtain a significant $p-$value and report *only* that $p-$value.
- Here's a pretty nice video on that topic if you're curious: https://www.youtube.com/watch?v=i6OwwZDA1CI

Learning Outcomes

- In service of the fourth goal, I encourage you to remember the advice I gave you about phrasing the results of a hypothesis test!

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Learning Outcomes

- In service of the fourth goal, I encourage you to remember the advice I gave you about phrasing the results of a hypothesis test!
- Specifically, a well-stated conclusion should include the level of significance (since different levels of significance can potentially lead to different conclusions of the test), as well as the null and alternative hypotheses that were chosen (again, different nulls/alternatives could lead to different conclusions!)

What Next?

- So... What Next??

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- Our department actually has a very nice array of classes available for you to take (many of which require PSTAT 120B as a prerequisite)!
- For example, we relied a lot on samples in this class. How do we take a “good” sample? Specifically, how should we conduct our sampling to allow for more accurate statistical analysis? These are the kinds of questions PSTAT 123 answers.

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- I also mentioned that there is a lot about hypothesis testing we didn't get to cover - PSTAT 120C will cover a lot of those missing areas.
- PSTAT 10 is also a great class if you're looking for an introduction to programming in R (a skill that is very useful in Data Science!)

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- Remember how I mentioned we'll almost always assume an i.i.d. sample in this class? Well, what happens if the data is correlated? For example, temperature measurements taken at noon at SBA will most certainly be correlated! PSTAT 174/274 helps us analyze data of this form.

What Next?

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- Bayesian statistics is become increasingly more popular (especially as computational abilities increase), as it provides *very* accurate results in *very* complex settings.

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- As our world becomes increasingly more complex, so too do the natures of uncertainties surrounding us.
- This is why I truly believe Statistics will never go out of Fashion!

So... Thank You for a Wonderful Quarter!

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